Heating Piping & Air Conditioning

DESIGN
INSTALLATION
OPERATION
MAINTENANCE

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INDUSTRIAL
COMMERCIAL
INSTITUTIONAL AND
PUBLIC BUILDINGS

Page 161—Journal Section of the American Society of Heating and Ventilating Engineers

JANUARY

1951 DIRECTORY & SHOW NUMBER

Keep heat and heating costs from "HITTING the CEILING"

THIS WINTER, why not see that you get *all* the heat you are paying for? Let Thermolier Unit Heaters bring both your heat—and your heating costs—down to a *reasonable* level.

HEATING COMFORT Thermolier Unit Heaters provide quick heating from a cold start. Desired temperatures are easily maintained within a close range. Heat is uniformly distributed in the working zone by forced air circulation. It is a very flexible system because different or changing heating requirements are easily satisfied by means of different models, a range of capacities, single — or two-speed motors and individual thermostatic controls.

LOW FIRST COST Thermolier Unit Heaters are so efficient and so compact that their heating capacity is often equivalent to the capacity of cast iron radiation or pipe coils of twice the cost. Additional savings are effected because the system requires a proportionately smaller amount of pipe, fittings and accessories.

ECONOMY OF OPERATION Heat is forced down to the working level . . . not banked uselessly at the ceiling level. Heat is turned on and off merely by throwing a switch either manually or automatically by simple thermostatic controls. The rapid response means that heat is furnished only when and where it is wanted . . . no heat is wasted.

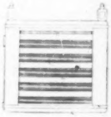
ADAPTABILITY TO EQUIPMENT AND FLOOR LAYOUT Thermolier Unit Heaters are widely used in industrial plants and warehouses, garages, stores and public buildings. The units and the simple piping are overhead where they do not interfere with arrangement of operating machinery or equipment and do not take up valuable floor or wall space. Units are easily relocated at any time to meet changes in layout.

THERMOLIER UNIT HEATERS HAVE IMPORTANT CONSTRUCTION ADVANTAGES The design of Thermolier Unit Heaters is the product of Grinnell Company's 100 years of heating experience. Heating experts like Thermolier's dependable operation, freedom from maintenance troubles and durability. Typical of its construction features is the patented internal cooling leg which permits the use of a plain thermostatic trap, the simplest, least expensive kind of a trap. Other features are built-in drainage, continuous rated capacity and provisions for expansion of U-tubes.

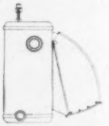
Get in touch with Grinnell or your local Thermolier distributor.

There is a type and capacity of Grinnell Thermolier for maximum heating results under every condition.

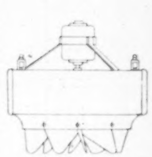
textile model



horizontal delivery



velocity nozzle



vertical delivery

GRINNELL

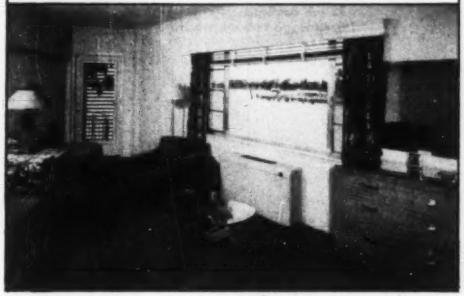
THERMOLIER UNIT HEATERS

GRINNELL COMPANY, INC., Providence, R. I. Warehouses: Atlanta • Billings • Buffalo • Charlotte • Chicago
Cleveland • Cranston • Fresno • Kansas City • Houston • Long Beach • Los Angeles • Milwaukee • Minneapolis • New York
Oakland • Philadelphia • Pocatello • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane

Tools of Air Conditioning

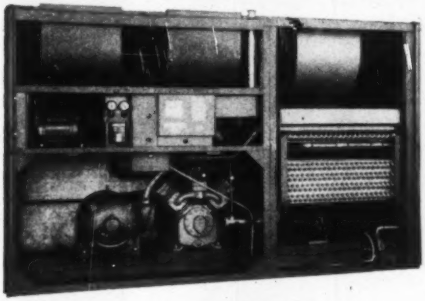
JOB IDEAS BY usAIRco

MODU-AIRE means "no ducts"



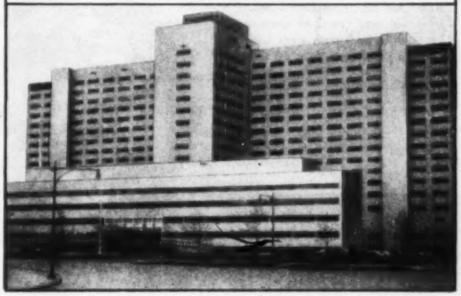
Timely tip! If the job's one of air conditioning an existing building, Modu-aire is your best bet. No need to rip out walls or partitions: no ducts required. Simply install individual Modu-aire units in each room and connect to central conditioning source with piping. Widely used in both new construction and remodeling.

Complete Central Heating-Cooling



It's usAIRco's REFRIGERATED KOOLER-AIRE! Contains the 3 major components of an air conditioning system in one compact unit—connected, charged, tested, balanced, ready to run. No complicated plumbing layouts, water towers or extra wiring. Just 3 easy connections to water, electricity, ducts. Cuts water consumption as much as 95%. Can be equipped for heating job too, by adding coil.

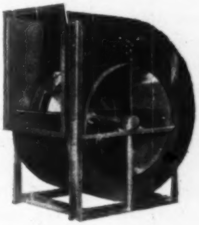
1,000 Bed Hospital: 54 usAIRco Blowers



Where the most exacting requirements must be met, usAIRco centrifugal blowers qualify in every respect. That is why they were selected to handle the air-moving job in the Fort Hamilton Veterans' Hospital, Brooklyn. Model chosen is the Type A backwardly inclined blower. Selection was made by U. S. Army Engineers.

Type A Blower with non-overloading characteristics

Blower chosen for the Veterans' Hospital above is especially adaptable to schools, hospitals, offices, factories. It is ideal for many types of installations. Wide range of sizes. Send for Bulletin 440.



Just published—new 8 page booklet on Refrigerated Kooler-aire. Send for your free copy now.

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Everything In Air Conditioning

United States Air Conditioning Corporation
3303 Como Avenue S.E., Minneapolis 14, Minnesota

Please send your new booklet, plus literature on items checked.

☐ Modu-aire ☐ Blowers

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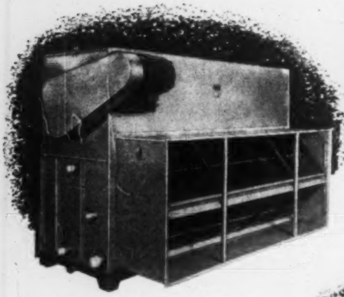
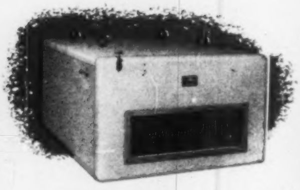
Address______________________________

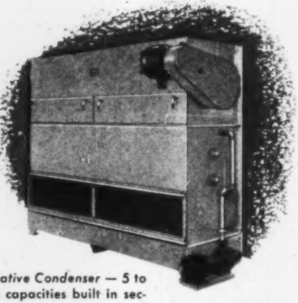
City________________ Zone____ State________



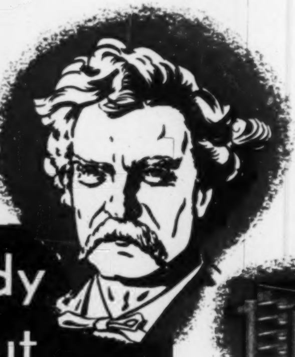
Air Handling Unit — Horizontal and Vertical units available in 8 case sizes with ratings of from 5 to 60 tons.



Comfort Conditioner — 2 case sizes with 900 and 1800 CFM and ratings of 3 to 8 tons.



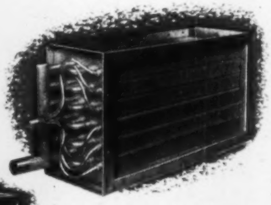
Evaporative Condenser — 5 to 75 ton capacities built in sections to go through standard doors.



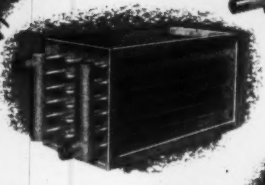
"Everybody talks about the weather..."

"but nobody does anything about it." Mark Twain (who lived a short distance from the present Bush plant) said that . . . and he was right. And he is still *half* right. Everybody *still* talks about the weather . . . more than ever before. But today something *is* being done about it. This determines *what* they say . . . and, most important, what they *buy*. Bush air conditioning and refrigeration equipment is designed to make customers and employees comfortable . . . and, because comfortable customers buy more and comfortable employees work harder, buyers of Bush equipment are more comfortable, too. Get acquainted with the Bush Representative in your territory and experience for yourself the comfortable feeling which comes with Bush service, engineering and dependability.

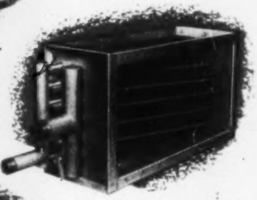
See the Bush Line at Booth 817, 10th Annual Air Conditioning Exposition, Commercial Museum, Philadelphia, Pa., January 22 — 26.



D X Coil — 6 standard heights and 17 lengths offer a wide variety of sizes for any direct expansion application.



Water Coil — For heating or cooling. Correctly circuited for minimum water pressure drop



Steam Coil — Available as standard or non-freeze. O-Gee curve allows free expansion of tubes. Sizes to match D X Coils.

Cooling Tower—Capacity ratings of 3 to 75 tons. Induced draft type permits locating anywhere inside or outside of building.

Buy the Best-and the Best is

BUSH

HEAT TRANSFER PRODUCTS

Bush Manufacturing Co.

WEST HARTFORD • CONNECTICUT

Heating Piping & Air Conditioning

(with which is merged the Aerologist)

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and Public Buildings

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WORTHINGTON AIR CONDITIONING REPORT

WORTHINGTON PUMP AND MACHINERY CORPORATION
HARRISON, NEW JERSEY

Specialists in air conditioning and refrigeration for more than 50 years

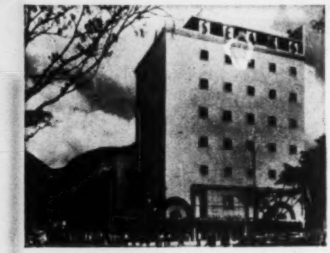
Cool Sears Gets Warm Reception In Rio

It was practically a fiesta day when Sears, Roebuck and Co. opened its new retail store in Rio de Janeiro.

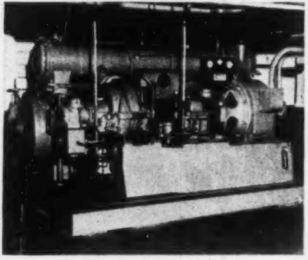
At dawn before the opening the lines had formed, and before the day was through, 123,000 Brazilians had stormed the premises. First day's receipts were in excess of $500,000.

Among the attractions in this new Sears store is Worthington air conditioning, a welcome feature in Rio's semi-tropical summers. Chilled water for the air conditioning is supplied by a 55C66 centrifugal refrigeration system.

Meanwhile, another Sears store, closer by in Trenton, New Jersey, was being equipped with Worthington air conditioning, joining other Worthington-equipped Sears stores in Allentown, Pa., Atlanta, Ga., Kansas City, Mo., and Knoxville, Tenn.



Sears, Roebuck store at Rio de Janeiro, Brazil, is air conditioned by means of Worthington centrifugal refrigeration.



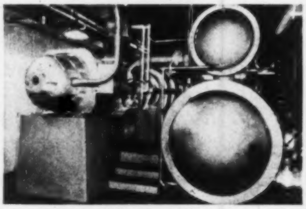
Worthington centrifugal compressor in Sears, Roebuck's Trenton, New Jersey, store.

How Insurance Company Insures Employee Morale

One of the biggest insurance companies in the country believes in insuring the happiness and efficiency of its personnel through air conditioning.

The new addition to the beautiful Omaha, Nebraska, home of the United Benefit Life Insurance Company, and its affiliates, is air conditioned throughout by a Worthington 75C99 centrifugal compressor with 727 ton capacity. This unit chills water, which is sent to air washers to control the temperature and humidity of the air, which is then distributed throughout the building. *Engineer: Charles S. Leopold, Philadelphia.*

Home office of the United Benefit Life Insurance Co., Omaha, Nebraska.



Worthington 75C99 centrifugal compressor at United Benefit Life Insurance Co.

Oilmen Strike It Lucky

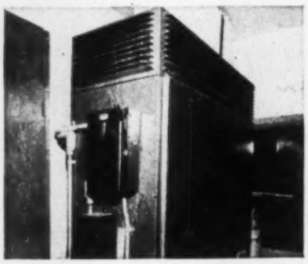
In the heart of the "oil country," at Garland, Texas, an up-to-the-minute new plant has been opened by Emsco Derrick and Equipment Company to provide oilmen with the latest in such essential equipment as sucker rods, deep well plunger pumps, etc.

For greater comfort of visitors and employees, as well as peak performance, the finest air conditions are maintained in the offices, laboratories and engineering rooms by Worthington equipment.

The large area of the main office is serviced by a 3HF6 Freon-12 compressor unit with an ECZ-301 evaporative condenser, and an AHY-301 Air Conditioning unit. Two SCY package air conditioners, designed for compact areas, cool the small offices in the shop section.

Architect: Fooshee and Cheek, Dallas

Modern new plant of Emsco Derrick and Equipment Company at Garland, Texas.



Worthington package air conditioner at Emsco.

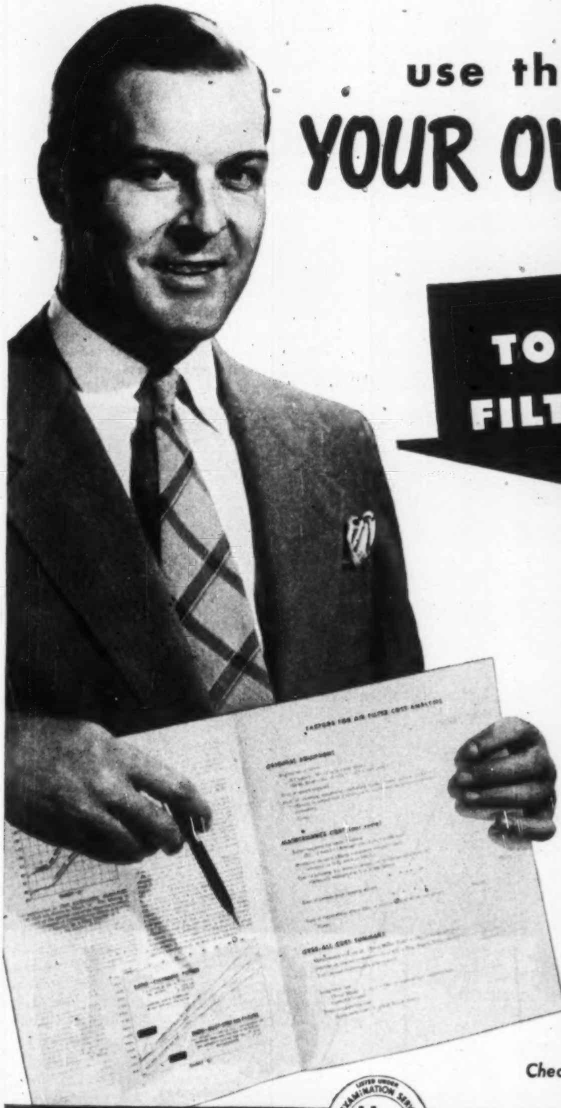
WORTHINGTON

AIR CONDITIONING AND REFRIGERATION

See our exhibit, Booth 103, at the International Heating and Ventilating Exposition, Commercial Museum, Philadelphia, January 22-26.

use these facts and YOUR OWN FIGURES

TO LOWER AIR FILTERING COSTS



Cleanable filters vs. DUST-STOP replacement-type filters . . . which is the lower in cost? You needn't guess . . . it's easy to figure the answer accurately. Just insert your own figures in the analysis form contained in the DUST-STOP "Comparative Study of Air Filtering Costs in Central Systems"—see how you can save money with DUST-STOPS. Use the coupon below for your free copy.

As you know, rising labor costs have made filter cleaning more expensive, on the other hand, mass production has lowered the cost of DUST-STOP Filters. As the "Comparative Study" shows, a cleanable filter would have to last *up to 14 years* (on the basis of one 40¢ cleaning every 90 days) in order to bring its cost down to the cost of DUST-STOP Filters replaced at the same intervals. Furthermore, your DUST-STOP system is made "brand new" every time you change the filters.

Check your air filtering costs—
send for a copy of this study today.

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COMPARATIVE STUDY of Air Filtering Costs in Central Systems

NAME ____________________
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CITY __________ ZONE ______ STATE __________

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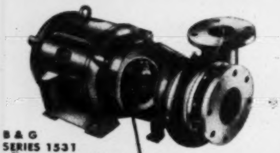
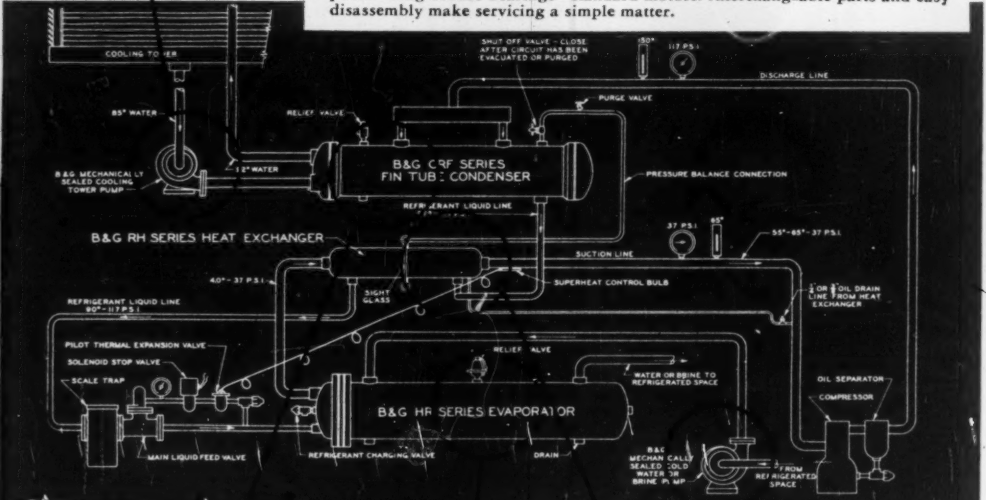


B & G SERIES 1531 CENTRIFUGAL PUMP

When you specify B & G Refrigeration Units you receive the benefits of a quarter century's experience in the design, manufacture and installation of heat transfer equipment.

B & G Condensers and Evaporators are designed to deliver maximum tonnage with minimum operating expense. They give long, trouble-free service—*because they're built right*—and have proved it in the field. You'll be particularly interested in the design of B & G Evaporators which assures uninterrupted flow of vapor and oil—a warranty of more efficient and dependable performance.

Next time you have a pump to buy, look first at the B & G Series 1522. Among its many features are the leak-proof Mechanical Seal—hydraulically balanced impeller—long bronze bearings—standard motors. Interchangeable parts and easy disassembly make servicing a simple matter.



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B & G MECHANICALLY SEALED COOLING TOWER PUMP
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SHUT OFF VALVE - CLOSE AFTER CIRCUIT HAS BEEN EVACUATED OR PURGED
150°
117 P.S.I.
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PURGE VALVE
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B&G RH SERIES HEAT EXCHANGER
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65°
55°-65°-37 P.S.I.
SUCTION LINE
40°-37 P.S.I.
SIGHT GLASS
SUPERHEAT CONTROL BULB
½ OR ¾ OIL DRAIN LINE FROM HEAT EXCHANGER
REFRIGERANT LIQUID LINE 90°-117 P.S.I.
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SCALE TRAP
RELIEF VALVE
WATER OR BRINE TO REFRIGERATED SPACE
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COMPRESSOR
B&G HR SERIES EVAPORATOR
MAIN LIQUID FEED VALVE
REFRIGERANT CHARGING VALVE
DRAIN
B&G MECHANICALLY SEALED COLD WATER OR BRINE PUMP
FROM REFRIGERATED SPACE

B & G CONDENSER

B & G EVAPORATOR

B & G SERIES 1522 CENTRIFUGAL PUMP

B & G HEAT EXCHANGER

Send today for catalogs giving descriptions and engineering data. When you've seen the facts you'll agree that here is refrigeration equipment you can depend upon.

Hydro-Flo* REFRIGERATION EQUIPMENT

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Dept. RBW-5, Morton Grove, Illinois
Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Road, Toronto, Canada

*Reg. U. S. Pat. Off.

Depend on FAR-AIR* for better air filtration . . .

Specify FAR-AIR Filters like this:

"Filters shall be permanent, impingement, washable, all metal, panel type. Media shall be zinc electroplated, 14 mesh steel screen, arranged in alternate layers of flat and herringbone-crimped screens, 4 layers of each per inch, rod reinforced, and enclosed in a frame of 16 ga. steel with flush mitered corners. Resistance to air flow of a clean filter shall not exceed 0.12" wg at 3.6 cfm per square inch of net face area.

"Holding frames shall be factory built of 16 ga. steel "T" section, bonderized and bake enameled, with felt air seal, interlocking edges, and filter locking device.

"Filters shall be FAR-AIR Type 44 and frames shall be FAR-AIR Standard Interlocking as manufactured by Farr Company, Los Angeles 43, California.

Your air conditioning system depends on proper air filters for its efficient operation and long service life, yet the air filters account for only a small percentage of the entire system's total cost. FAR-AIR filters cost a little more than ordinary types but they are worth far more than they cost because *they have no equal* in efficiency, dirt-holding capacity, ease of cleaning and quality of construction.

Install Far-Air Filters now and take advantage of their over-all economy while enjoying better air filtration. Write for complete information.

Users of FAR-AIR Filters include:

Carnation Co. • Eastman Kodak Co.
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*Trade Mark Reg.

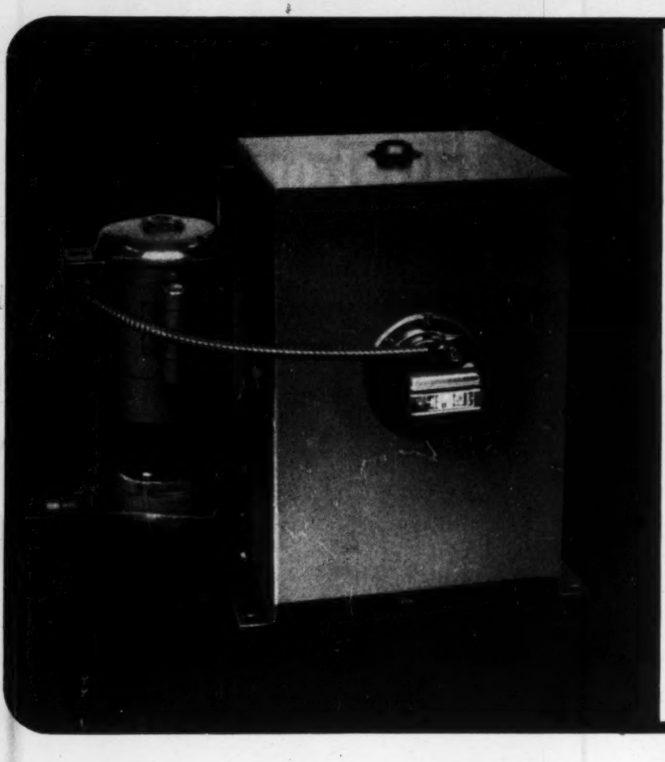
FAR-AIR FILTERS

"Better by Farr"

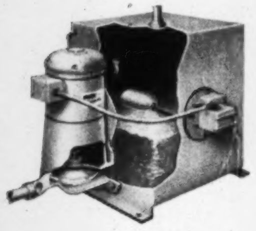
FARR COMPANY *Manufacturing Engineers*

Los Angeles • Chicago • New York
Mf'd under license by Control Equipment Co., Ltd., Montreal, Canada

new dunham condensation pumps



other design features you'll want to know about



1. Completely Wired—ready for operation when piping connections are made.

2. Motors Mounted well above floor protect against surface water and floor cleaning operations.

3. Hydraulically Balanced enclosed type impeller; no close tolerances.

save space . . . save fuel
save on installation expense

Both you *and* your customer benefit when you install these new, more compact Dunham Condensate Pumps. You . . . because they're so easy to install. Your customer . . . because these efficient, long-lived pumps:

Save Space—Dunham pumps take surprisingly little floor space; are easy to handle, easy to warehouse. Also, they often increase usable heated space by permitting installation of radiation below boiler water level.

Save Fuel—Rapid return of hot condensate to boilers, rather than wasting it to sewers, saves makeup water . . . minimizes difficulties from boiler encrustation.

Save On Installation Expense—Two anchor bolts do entire job . . . no bars or bed plates necessary. Low level inlet connection permits gravity flow of condensate from return lines into receiver.

Send for new pump bulletin No. 1401-2. Contains complete information . . . including capacity tables, installation instructions, design details and typical specification sheets. Write today for your copy.

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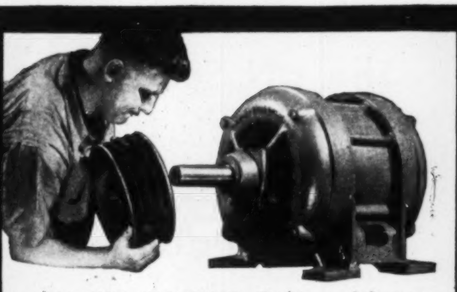
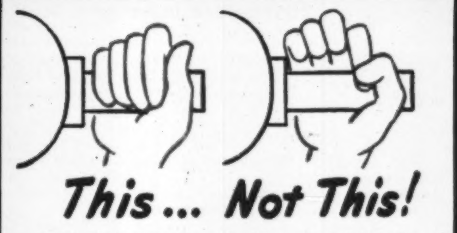
heating systems and equipment

Vari-Vac Differential Heating • Fin-Vector Radiation • Convector Radiation
Vacuum Pumps • Baseboard Radiation • Horizontal Heaters • Vertical Heaters • Cabinet Heaters • Traps • Valves

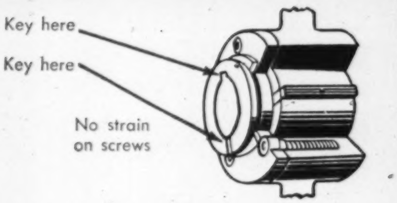
TEXROPE



ONE PIECE MOUNTING—Bushing and sheave go on together. Alignment is easy. Sheave is on right first time.


This... Not This!

FULL CIRCLE GRIP — Bushing split full length. Collar is separate. Shaft gripped full length around full diameter.



POSITIVE DRIVE — Bushing is keyed to both shaft and sheave. No slipping. No sheared screws. No jammed bushings.

USE FAST-MOUNTING Magic-Grip SHEAVES

Full Grip...No Slip!

MAGIC-GRIP SHEAVE is the fastest mounting sheave you can buy. And you can demount it just as fast. It runs true, will not slip or jam. It always comes off easily without hammering, forcing, or distortion.

Best of all it costs no more than an ordinary sheave. Even if you don't change sheaves often, you should have *Magic-Grip* sheaves on every drive to eliminate the possibility of shaft and bearing damage when ordinary sheaves are hammered or pried on or off. Sizes 1 to 250 hp.

WIDEST V-BELT LINE

You can get everything you need for your V-belt drives from one reliable source. Allis-Chalmers offers the broadest line of V-belts, speed changers, and standard and variable speed sheaves in the industry. And you get the extra engineering skill that comes from having more industrial V-belts, installations than any other manufacturer.

Get the 120 page *Texrope* Pre-Engineered Drive Manual 6956 from your A-C Authorized Dealer or Sales Office, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3240

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

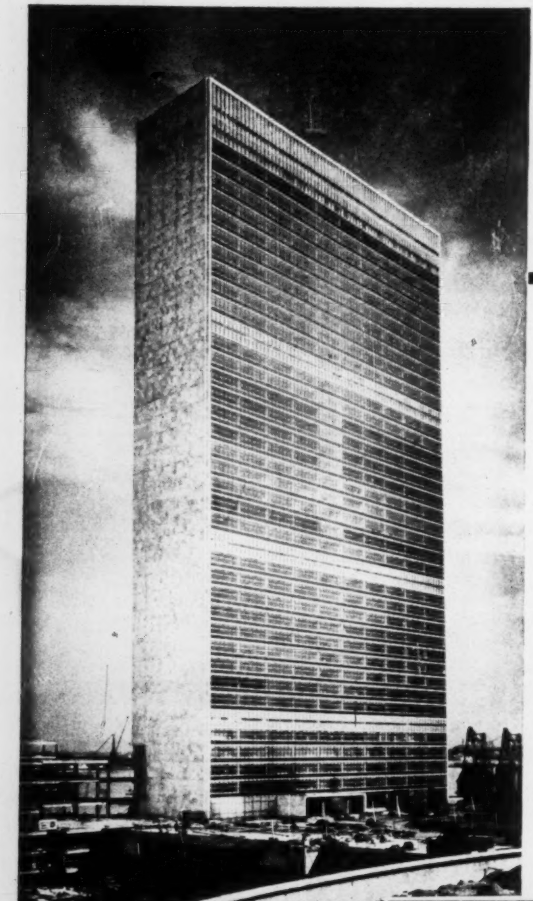
MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

Texrope and Magic-Grip are Allis-Chalmers trademarks.

ALLIS-CHALMERS A-C



New UN Secretariat Building, N. Y. C.
Syska and Hennessy, Inc., Consulting Engrs.
Fuller-Turner-Walsh-Slattery, Inc.,
General Contractor
Eugene Duklauer, Inc., *Plumbing Contractor*
Almirall & Company, Inc.,
Heating Contractor

The UN Secretariat is a TRULY MODERN building

...SILBRAZ® joints

made with Walseal® Valves and Fittings are installed

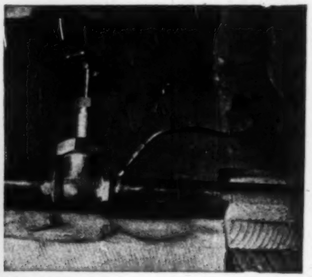
Architects and builders know that it takes modern building components to make a modern building. That's why the first skyscraper erected on the site of the United Nations' buildings has brass and copper pipe runs joined with Silbraz joints – the modern way of joining brass or copper pipe or Type B copper tubing. Silbraz joints are silver brazed – not soldered or threaded – and are stronger than the pipe itself. They are leakproof, permanent, and will not creep or pull apart under any condition which the pipe or tubing can withstand. They literally form "one-piece pipelines" that save money by eliminating leaky connections, costly maintenance, and repairs.

Walseal Valves and Fittings for making Silbraz Joints

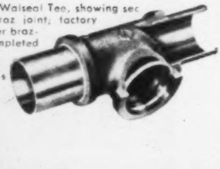
The Walworth Company manufactures a complete line of Walseal Valves, Fittings, and Flanges having factory-inserted rings of silver brazing alloy, for making Silbraz joints. The Walseal material used in the United Nations building was furnished by Glauber, Inc., and Asco Supply Company, Inc., both of New York City.

For further information regarding Walseal Valves, Fittings, and Flanges for making Silbraz joints, see your nearest Walworth distributor, or write for Circular 84.

Making a Silbraz joint with a Walseal Gate Valve of UN, work being done at bench.



Installing a Walseal fitting at UN, on location; note operator progressively heats small section of the fitting.



Cut-away view of a Walseal Tee, showing sectional view of Silbraz joint, factory inserted ring of silver brazing alloy; and completed Silbraz joint.

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORL

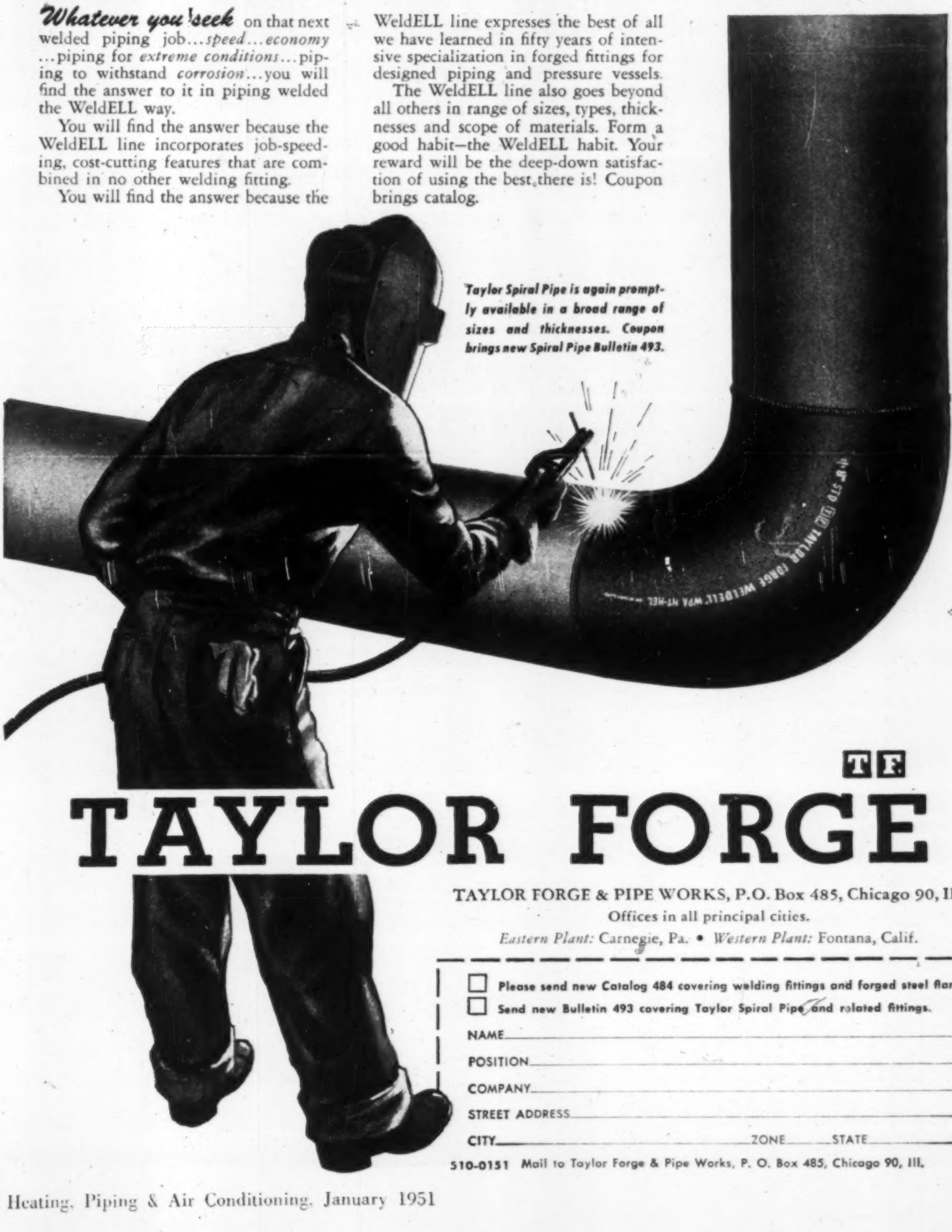
WeldELLS®

Whatever you seek on that next welded piping job...*speed*...*economy*...piping for *extreme conditions*...piping to withstand *corrosion*...you will find the answer to it in piping welded the WeldELL way.

You will find the answer because the WeldELL line incorporates job-speeding, cost-cutting features that are combined in no other welding fitting.

You will find the answer because the WeldELL line expresses the best of all we have learned in fifty years of intensive specialization in forged fittings for designed piping and pressure vessels.

The WeldELL line also goes beyond all others in range of sizes, types, thicknesses and scope of materials. Form a good habit—the WeldELL habit. Your reward will be the deep-down satisfaction of using the best there is! Coupon brings catalog.



Taylor Spiral Pipe is again promptly available in a broad range of sizes and thicknesses. Coupon brings new Spiral Pipe Bulletin 493.

TF

TAYLOR FORGE

TAYLOR FORGE & PIPE WORKS, P.O. Box 485, Chicago 90, Ill.
Offices in all principal cities.
Eastern Plant: Carnegie, Pa. • *Western Plant:* Fontana, Calif.

☐ **Please send new Catalog 484 covering welding fittings and forged steel flanges.**
☐ **Send new Bulletin 493 covering Taylor Spiral Pipe and related fittings.**

NAME______________________________

POSITION____________________________

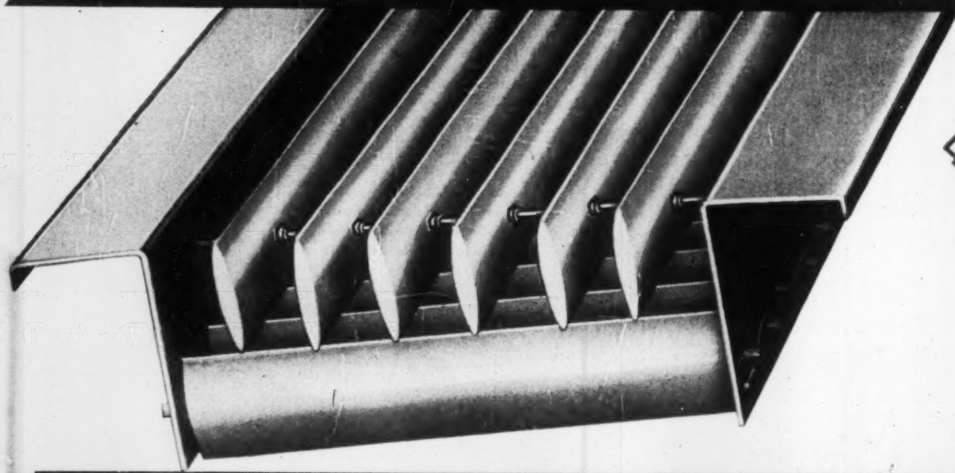
COMPANY____________________________

STREET ADDRESS________________________

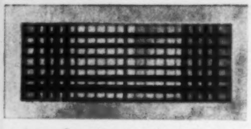
CITY________________ZONE______STATE________

510-0151 Mail to Taylor Forge & Pipe Works, P. O. Box 485, Chicago 90, Ill.

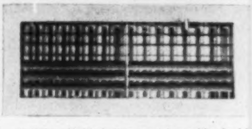
The MOST GRILLES EVER



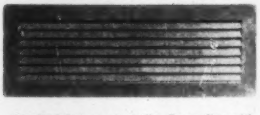
A COMPLETE LINE—THAT MAKES ANY AIR CONDITIONING SYSTEM A BETTER SYSTEM



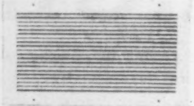
L-270 One-piece, extra-heavy frame. Air-tight gasket. Individual blade adjustment. Wind tunnel tested to give perfect draft-free distribution.



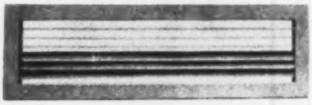
L-274 Multi-shutter register with double directional grille and multi-shutter damper. Positive volume control and shut-off. AIRFOIL louvers on ¾" centers.



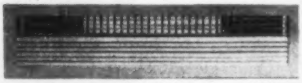
RL-230 Return air grille. Deep fins with easy curved deflection on ¾" spacing. Rugged construction. Outstanding appearance.



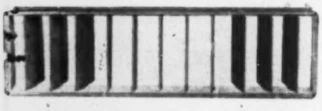
RL-21 Return air grille. Fixed blades. ⅜" centers. Deep fins. Extra-strength frame.



L-1 High-quality, commercial-type grille. One set AIRFOIL louvers. ¾" spaced. Two-way diffusion. Concealed support. No mullions, butted construction.

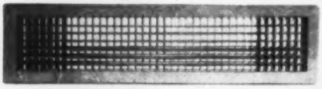


L-8 AIRFOIL directional outlet. Horizontal front louvers—vertical rear louvers. Placed on ½" centers.



AG-25 Fits duct behind grille. Insures even distribution of air. Blades individually adjustable. Extra-rigid frame. Held in place by friction—no screws. Installs quickly

AF-325 Combination grille—volume controller. For exposed duct work. 4-way distribution. Cuts installation in half—costs 30% less than separate volume controller and grille.



L-2 AIRFOIL directional outlet. 4-way diffusion. 2 sets of louvers. Blades individually adjustable. Horizontal front louvers—vertical rear louvers.

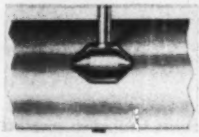
EFFICIENT DESIGNED

AirFoil

AIR CONDITIONING OUTLETS

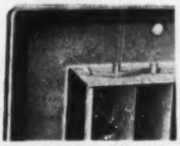
● Sharply increasing numbers of architects, contractors and air conditioning engineers are specifying AIRFOIL grilles —why?—SUPERIOR CONSTRUCTION IS THE SECRET. Such exclusives as *solid-section, streamlined louvers, concealed louver bearing supports, no mullions, extra-strength frame*—these give you AIRFOIL air distribution *performance—a performance that has no equal in efficiency.*

NEW CONCEALED BEARING LOUVER SUPPORT



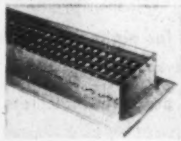
Enables AIRFOIL grilles to be made any length—with no mullions—no ugly butted construction. Bearing nestles in center of louver. Rounded bearing surface maintains valuable streamlining. Permits quick, easy adjustment.

SMOOTH, MITERED CORNERS

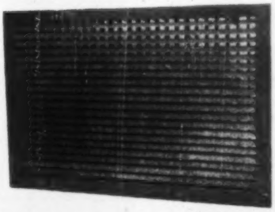


AIRFOIL features one-piece frames. Smooth contour gives handsome, compact design that blends with room. Careful craftsmanship and deft designing is available that cannot be obtained in any other grille at any price.

UNIFORM LOUVER TENSION



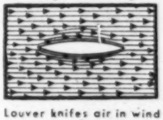
Heavy, spring steel wire keeps blades in any position. Permits easy adjustment—never loses tension. Keeps blades from freezing. Makes possible correct adjustment on first installation. Eliminates costly call-back and readjustment.



RL-240 Combined air grille and multi-shutter damper blades. Louvers ¾″ spaced. Rear blades 1¼″ deep. Spaced on 1″ centers. Removable lever lock.

Protect costly air conditioning installations with the finest outlets money can buy. Poor air distribution can cause real trouble. AIRFOIL grilles have simplicity of design—no unnecessary parts. No clumsy bulk. Superior strength with no added weight. They're easy to install—easy to carry—easy to fit. Save costly time and labor.

These outstanding grilles are priced down to give you more value, more performance, more efficiency at lower cost.



Louver knifes air in wind tunnel tests. Turbulence has been almost completely eliminated. Glass-smooth surface gives more complete air control.

NOTE THESE OUTSTANDING FEATURES!

- Smooth-as-glass AIRFOIL louvers
- Extra-strength frames
- Air-tight, rubber gaskets
- Individual louver adjustment
- Removable lever locks

Remember, AIRFOIL grilles handle higher velocities with *minimum turbulence, minimum noise* and *near-perfect, draft-free performance.*

FREE

Check type of grille on which information is desired.

☐ Air conditioning outlets
☐ Return air grilles and registers
☐ Volume controllers
☐ Perforated metal and ornamental grilles
☐ Door ventilators
☐ Special made-to-order grilles

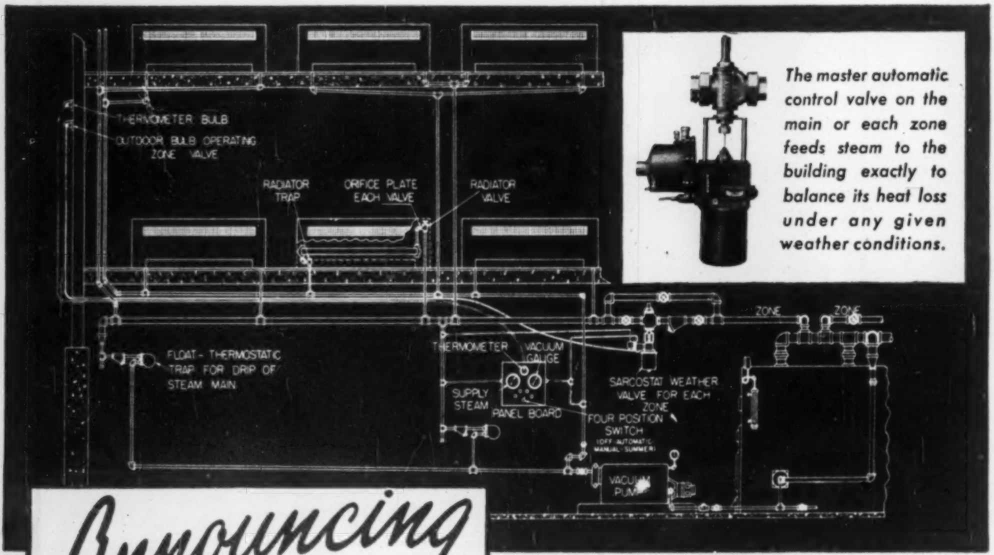
TITUS MANUFACTURING CORP. • Waterloo, Iowa

☐ RUSH information on complete catalog.
☐ Literature on above checked items.

NAME______________________________

ADDRESS______________________________

CITY____________________ STATE__________


THERMOMETER BULB
OUTDOOR BULB OPERATING ZONE VALVE
RADIATOR TRAP
ORIFICE PLATE EACH VALVE
RADIATOR VALVE
FLOAT-THERMOSTATIC TRAP FOR DRIP OF STEAM MAIN
THERMOMETER
VACUUM GAUGE
SUPPLY STEAM
PANEL BOARD
SARCOSTAT WEATHER VALVE FOR EACH ZONE
FOUR POSITION SWITCH (OFF-AUTOMATIC-MANUAL-SUMMER)
ZONE
ZONE
VACUUM PUMP

The master automatic control valve on the main or each zone feeds steam to the building exactly to balance its heat loss under any given weather conditions.

Announcing Sarcostat

WEATHER COMPENSATING CONTROL FOR STEAM HEATING SYSTEMS

After intensive development work over a period of years, and on conclusion of field tests upon a number of pilot installations, we are ready to offer this radically new system of controlling heat supplied to buildings of all types, direct by outside temperature.

It is ideal for vacuum or vapor steam heating systems as now used in apartments, housing projects, hotels, and commercial and industrial buildings.

It will save its moderate cost in a short time by assuring heating comfort without fuel waste.

THIS CONTROL PANEL GIVES YOU...

1. **Complete flexibility of operation, including "automatic," "manual," "summer," and "off" switch positions.**
2. **Indicator lights for each position.**
3. **Built-in time clock for night set-back and early morning pick-up.**
4. **Temperature and pressure indicators as specified.**

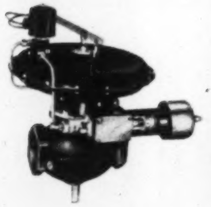
ASK FOR BULLETIN No. 200

330

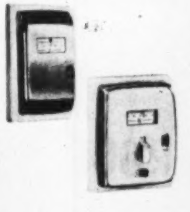
SARCO
SAVES STEAM

SARCO COMPANY, INC.
Represented in Principal Cities
Empire State Building, New York 1, N. Y.
SARCO CANADA, LTD., TORONTO 5, ONTARIO

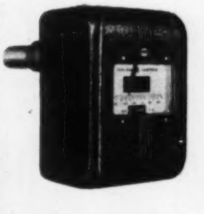
IMPROVES PRODUCT QUALITY AND OUTPUT



B-55 G Governor Type Valve



T-70 and T-70T Thermostats

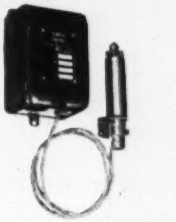


L-32 Immersion Thermostat

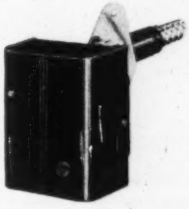
5B Interval, On-Off Time Switch

for better
HEAT CONTROL
check
GENERAL CONTROLS

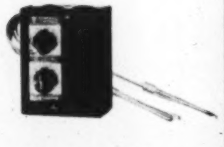
Whatever the *control* problem . . . whether it's *product* control . . . or process control . . . in any application where a higher level of operating performance is the goal . . . *automatic* controls more often than not form the solution . . . and in the field of automatic controls . . . there's certain to be a General Control that can be relied upon to do a better job. That's why more and more of the leaders in American Industry are joining in the big swing to General Controls . . . that's why there are so many new voices in the rising chant that, "for the best in automatic control, it's General Controls."



A-100 Thermopilot Relay

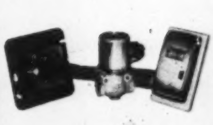


R-99 Stack Switch

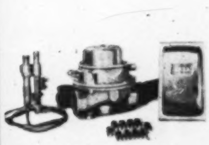


L-54 Solid Charge Combination Fan and Limit Control

Hydramotor G 1-7



T-30 Package Set



BX-69 Package Set

SIMPLIFIED TWO WIRE CONTROLS ARE BETTER

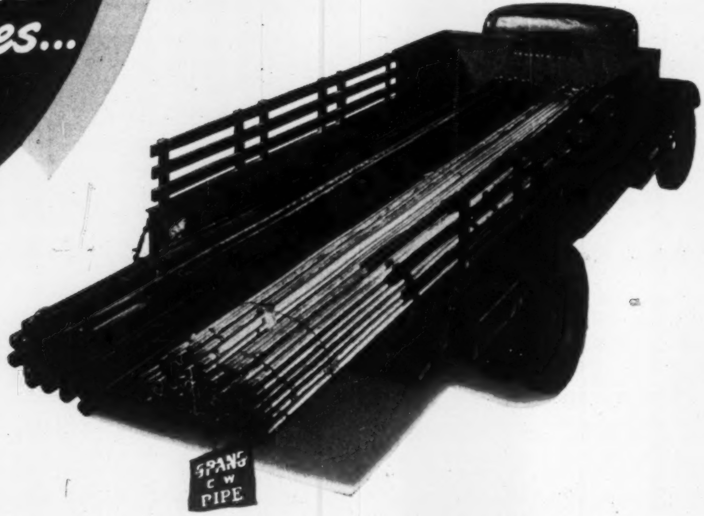
See us at the 10th International Heating and Ventilating Exposition in Philadelphia — January 22nd-26th, 1951 — Booth 702.

GENERAL CONTROLS
801 Allen Avenue Glendale 1, California
Manufacturers of Automatic Pressure, Temperature, Level and Flow Controls

FACTORY BRANCHES: Baltimore 5, Birmingham 3, Boston 16, Buffalo 3, Chicago 5, Cincinnati 2, Cleveland 15, Dallas 1, Denver 4, Detroit 21, Glendale 1, Houston 6, Kansas City 2, Minneapolis 2, Newark 6, New York 17, Philadelphia 23, Pittsburgh 22, St. Louis 12, San Francisco 7, Seattle 1, Tulsa 6. DISTRIBUTORS IN PRINCIPAL CITIES

your Spang
CW
distributor
believes...

That good service pays



Your Spang CW Pipe Distributor makes your problems his when you call him. He knows that good service means satisfied, lasting customers. And he's more than willing to go out of his way to see that you get prompt, efficient service in emergencies.

He also knows that it pays to handle products of fine quality. That's why he stocks and recommends Spang CW Pipe. He knows that Spang CW gives long, trouble-free service. One of the reasons why this is true is because of the final finishing and descaling operations in its manufacture. This assures a smooth, scale-free inside surface that minimizes dangerous and costly valve clogging.

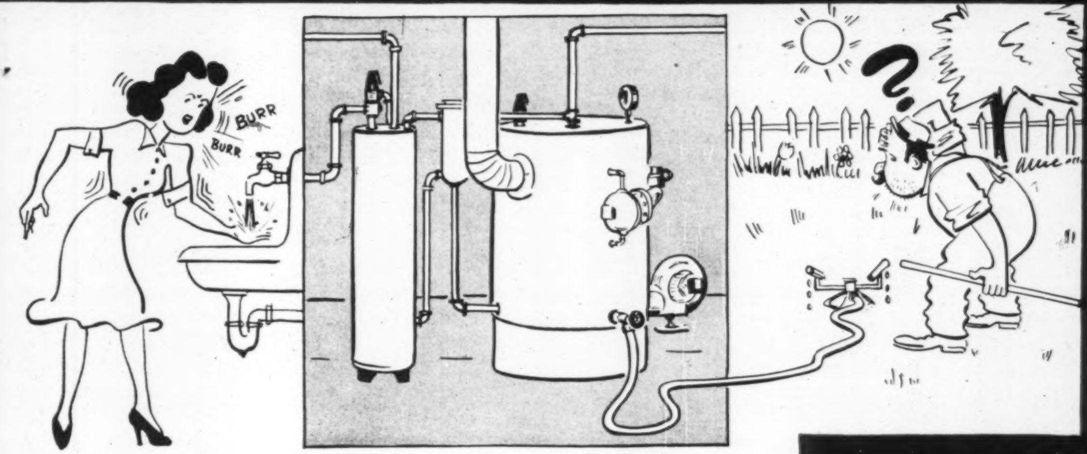
During these days of unprecedented demand, it's sometimes difficult for your Spang Distributor to fill your orders as quickly as he would like. But you can depend on him to render the best possible service in face of some rather difficult conditions.

SPANG-CHALFANT
Division of The National Supply Company
EXECUTIVE OFFICES: PITTSBURGH, PA.
District Sales Offices: Atlanta; Boston; Detroit; Houston;
Los Angeles; New York; Philadelphia; Pittsburgh; St. Louis

SPANG
CW

QUALITY
that is recognized wherever pipe is used

You only THINK you've heard everything!



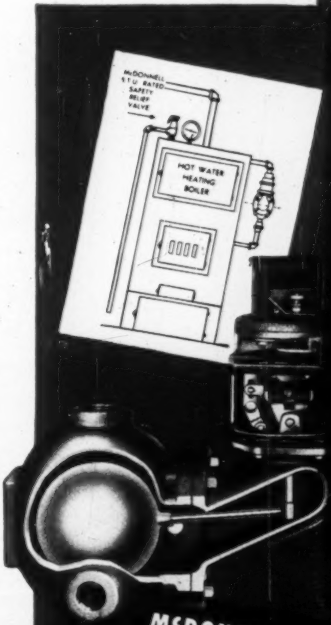
Just listen to this: A letter from a heating man in Florida (who asks, for obvious reasons, that his name be withheld) reads as follows:

> "A gardener in a local residence connected a garden hose with a lawn sprinkler at the end of it to [of all things] the boiler drain. Then he opened the drain valves and went his way. The boiler is a hot water heating boiler with indirect domestic water heater, so the complaint from the owner was that the hot water heater wasn't working [That's easy to believe!]. Fortunately nothing serious happened because the boiler was equipped with a McDonnell & Miller Low Water Cut-off which stopped the oil-burner when the level dropped."
>
> *Yours truly, J.C.P.*

This was one for the cartoon department, but the over-all picture isn't funny at all. It's just one more confirmation of our often repeated statement that no one on earth can foresee when or why the water will leave a boiler. It also backs up our statement that there are just about as many reasons for losing the water level in a hot water heating boiler as in a steam boiler. Lucky it was that this hot water boiler was equipped with a McDonnell Low Water Cut-off. Too many of them are not.

The McDonnell No. 63 Low Water Fuel Cut-off (opposite) has been specifically designed for these too often neglected hot water heating boilers. (Our No. 67 Cut-off used on steam boilers is not designed for the higher allowable pressures of the hot water heating boilers and our No. 150, designed for 150 lbs. maximum, is of more expensive construction than needed for low pressure hot water heating.)

Built for pressures up to 50 lbs., this is the ideal cut-off for the hot water boiler. Into it has gone the best of all we have learned in many years of "Doing One Thing Well." Ask for bulletin containing facts and installation data.



McDONNELL
NO. 63

McDONNELL & MILLER Inc. • 3500 N. Spaulding Ave. • Chicago 18, Ill.

Doing One MM SAFETY CONTROLS *Thing Well*

Your Jobber Stocks Them

Boiler Water Level Controls

An ILLINOIS Automatic Type E Cycling Flow Control System

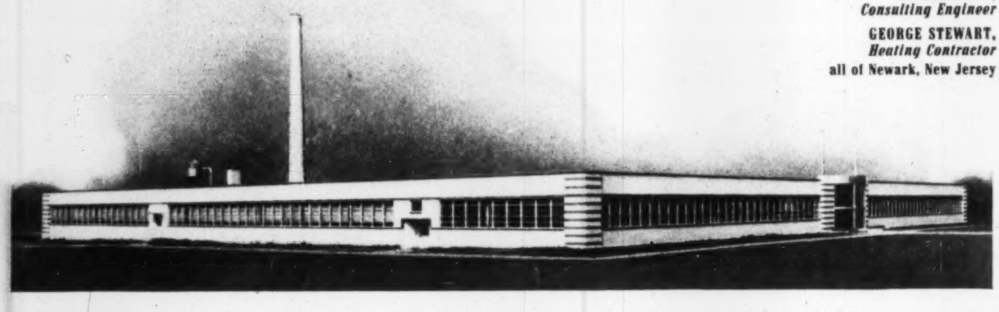
FORSTNER CHAIN CORPORATION BUILDING

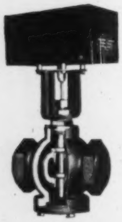
EPPLE & SEAMAN,
Architects

FLOYD J. YEWELL
Design Consultant

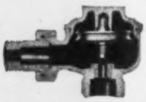
HERBERT FOX,
Consulting Engineer

GEORGE STEWART,
Heating Contractor
all of Newark, New Jersey

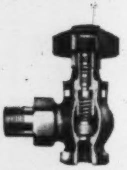




Type E
Motorized Control Valve



Series G Thermo Trap



Series 48 Supply Valve

In this modern factory of the Forstner Chain Corporation, an ILLINOIS Type E Zone Control System assures fuel economy, heating comfort and the convenience of fully automatic operation.

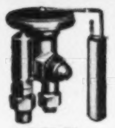
The boiler plant, oil fired, is in a separate building and unattended except for periodic inspection. Boiler pressure at 14 pounds is used for process work and unit heaters serving the loading platforms. An ILLINOIS Pressure Regulating Valve reduces this to 4 pounds for convectors used to heat the remainder of the building, which is divided into five zones . . . one office and four manufacturing. Each zone is independently controlled by its own motor valve and outdoor-indoor-radiator temperature controller, with provision for automatic night, week-end and holiday set-back.

These controls are interlocked with the oil burners and arranged to shut down the boilers when no steam is required; and start the burners when any one section calls for heat. ILLINOIS valves, traps and controls maintain even temperature and continuously warm radiation, fully or fractionally filled to balance the vagaries of the climate.

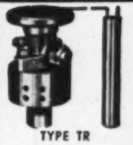
Write for Bulletins

ILLINOIS ENGINEERING COMPANY
INCORPORATED 1900
RACINE AVENUE AT 21ST STREET • CHICAGO 8

THERMO EXPANSION VALVES


TYPE TK
"3 valves in 1"

TYPE TCL


TYPE TR
Multi-Outlet

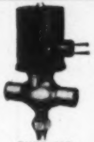
TYPE 402
with pressure limiting feature

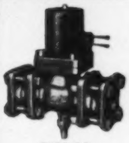
THERMO-LIMIT
with pressure limiting feature

For automatic control of liquid refrigerant on all types of refrigeration and air conditioning systems. Capacities: from fractional tonnage to 50 tons "Freon-12", 100 tons Methyl Chloride. Low temperature valves for −40° F. to −100° F.

SOLENOID VALVES

TYPE S1


TYPE M3


TYPE R2

For all types of service. For liquid: "Freon" — up to 75 tons. Methyl Chloride — up to 150 tons. For suction: "Freon" — up to 8.8 tons. Methyl Chloride — up to 17 tons. For brine, water, gas, air and steam.

FLOAT VALVES AND SWITCHES

TYPE HK
high pressure float valve
Up to 5 tons "Freon-12", 10 tons Methyl Chloride and 20 tons Ammonia.

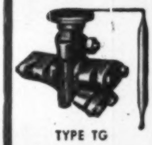
TYPE J5
electric float switch
For "Freon", Methyl Chloride, Ammonia and other non-corrosive liquids having a specific gravity of .6 or more. Up to 460 volts AC and 250 volts DC.

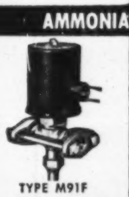
ALCO VALVES

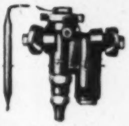
the COMPLETE LINE of refrigerant controls

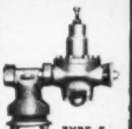
Solenoid Liquid Valves — up to 172 tons. Solenoid Suction Valves — up to 28 tons. Thermo Expansion Valves—from fractional tonnage to 125 tons. Automatic Expansion Valves — from fractional tonnage to 60 tons.

AMMONIA CONTROLS

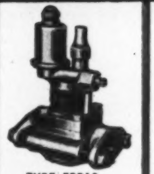

TYPE TG

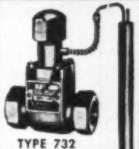

TYPE M91F

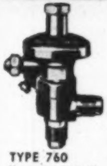

TYPE UGZ


TYPE E
with Strainer

SUCTION LINE CONTROLS


TYPE EPR13
For all refrigerants, with connection sizes up to 6".


TYPE 732
SNAP-ACTION SUCTION VALVE
Temperature operated —½ ton, "Freon-12"— 1 ton, Methyl Chloride.


TYPE 760
"EVAPOTROL"
Pressure regulator—½ ton, "Freon-12"—¾ ton, Methyl Chloride.

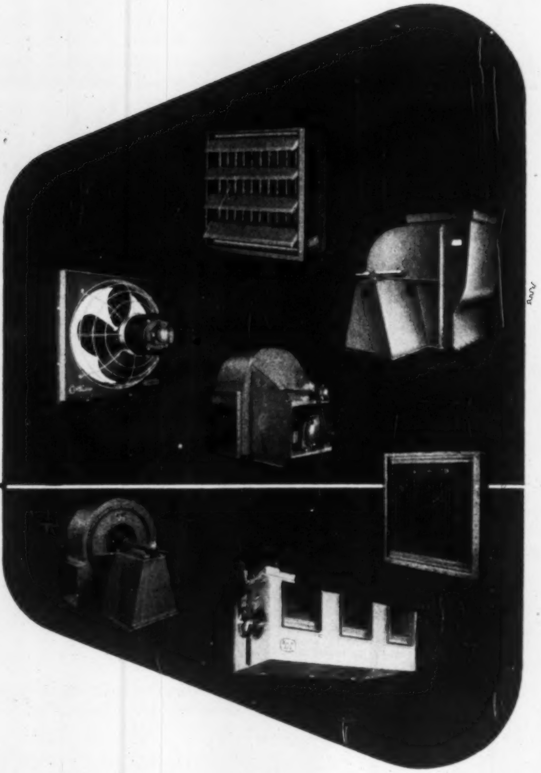
For capacities in excess of those listed, write us for further details and give specific requirements.

ALCO ALSO MAKES: Constant Pressure Expansion Valves—Liquid and Suction Line Strainers. Available at your wholesaler's.

ALCO VALVE CO.
861 KINGSLAND AVE. • ST. LOUIS 5, MO.

perfected engineering
precision manufacture
certified ratings

nyb



responsible guarantees
of dependable performance

May we take this opportunity to express our sincere appreciation to our many friends in the industry for their cooperation and good will.

MEMBER NATIONAL ASSOCIATION OF FAN MANUFACTURERS AND INDUSTRIAL UNIT HEATER ASSOCIATION

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VENTILATING EXPOSITION
COMMERCIAL MUSEUM-PHILADELPHIA
JANUARY 22-26, 1951

SEE OUR CATALOG IN SWEET'S

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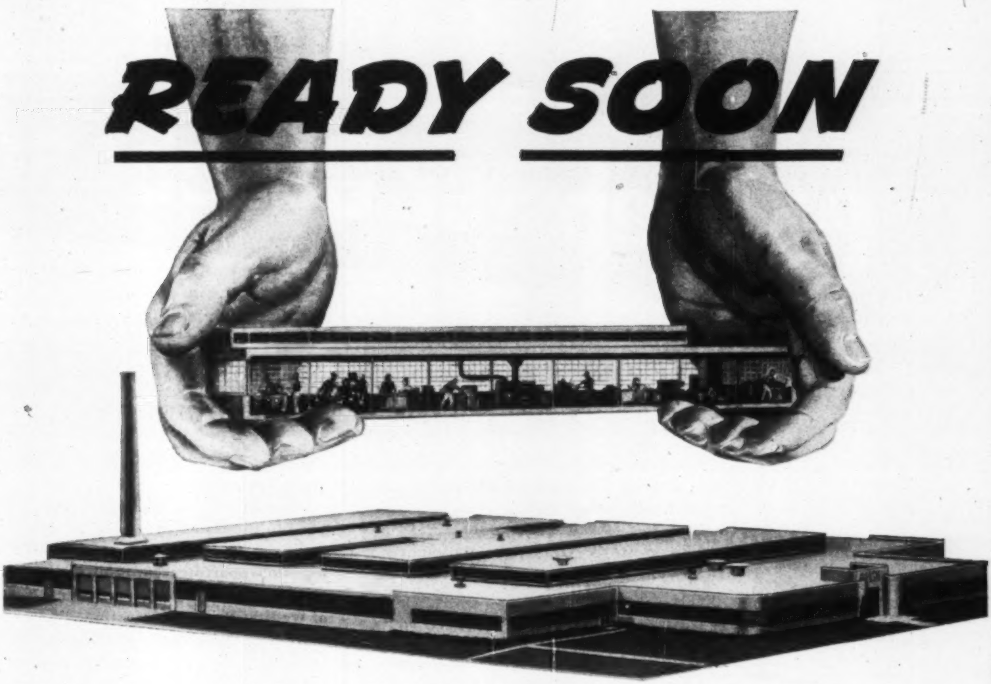
THE NEW YORK BLOWER COMPANY

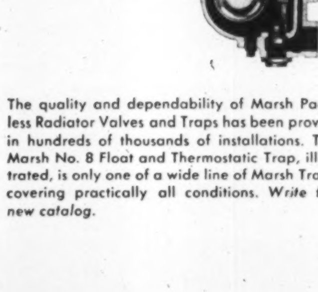
GENERAL OFFICES • 32nd STREET & SHIELDS AVENUE • CHICAGO - 16
FACTORIES AT LAPORTE, INDIANA AND CHICAGO, ILLINOIS

READY SOON



A big addition to the still new MARSH PLANT

25% more service-for-you space —



The quality and dependability of Marsh Packless Radiator Valves and Traps has been proved in hundreds of thousands of installations. The Marsh No. 8 Float and Thermostatic Trap, illustrated, is only one of a wide line of Marsh Traps covering practically all conditions. *Write for new catalog.*

It seems almost yesterday (actually 1948) that we announced the completion of our new modern plant at Skokie, Ill., close-in suburb of Chicago. And now we are announcing the completion of a large addition to this *still new* plant!

Such swift expansion is no mere happenstance. Long before we built our Skokie plant we had planned it down to the last detail to give new scope to the production principles that have enabled Marsh products to set their own standards . . . for quality . . . for downright *value.*

How well we accomplished our objectives—how much we exceeded even our own expectations—is convincingly attested by the need for this big addition to keep pace with the ever-accelerating demand for Marsh instruments, heating specialties, and refrigeration equipment.

This increased manufacturing space will provide facilities to maintain Marsh quality standards while giving you Marsh products at a faster pace. It is 25% more service-for-you space.

MARSH HEATING EQUIPMENT CO.
Sales affiliate of Jas. P. Marsh Corporation
DEPT. T. SKOKIE, ILL.

MARSH *Heating Specialties*
SINCE 1865

It's Webster Baseboard

IT'S THEIR 5TH AND LARGEST GARDEN APARTMENT PROJECT—AND THEIR 5TH AND LARGEST INSTALLATION OF WEBSTER BASEBOARD HEATING . . .

HEATING FOR HOMES, TOO

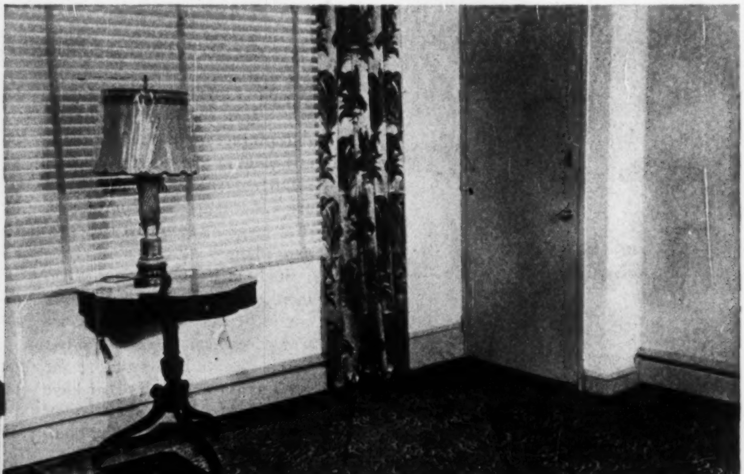
Webster Baseboard Heating is even more widely used in residential dwellings—from the finest custom-built house to a small "Cape Cod" (with or without basement). Webster Perimeter Heating, with a separate loop for each floor or section, makes Baseboard Heating practical. For new homes or modernization.

It's Webster Baseboard Heating again—in the fifth and largest garden apartment project built since 1947 by Housing Engineering Co., of Baltimore. Monroe Park, in rolling Westover Hills near Wilmington, Delaware, offers luxury living at moderate cost to 606 families.

Housing Engineering Co., of Baltimore, has a proven formula for successful garden apartment construction and operation—determine the need, select a suitable site, secure the backing of outstanding lending organizations, follow sound principles in planning and construction, adopt a wise management policy.

Monroe Park is outstanding in many ways, but the thousands of visitors at their two-day open house were impressed with the ingenious apartment layouts, the all-electric kitchens, and the comfort and cleanliness of Webster Baseboard Heating.

Webster Baseboard Heating—by using the true perimeter principle—requires less piping, saves an average of 10% in piping and risers as compared with hot water and radiators. Robs tenants of no floor space.



Living room at Monroe Park Apartments where Webster Baseboard Heating warms every outside wall evenly from the baseboard up—including picture window areas. Heating Contractor Gordon McKewin, Baltimore, also made the Webster Baseboard Heating instal- ion in four other jects for same ers.

Heating Again

Provides maximum comfort to tenants as well as low operating costs through Webster outdoor control plus the even temperatures attained by perimeter heating principles.

Heating is controlled automatically by 19 Webster Continuous Flow Hot Water Heating Controls and accompanying control valves. When indoor temperatures are adequate, water by-passes the boiler to prevent wasteful overheating.

Housing Engineering Co. first used Webster Continuous Flow Hot Water Heating Controls in a Pennsauken, N. J. project in 1948-49. Based on this experience, they have provided similar controls for both projects built since that date.

The garden apartments built by Housing Engineering Co. since 1947 have been underwritten by such outstanding firms as New York Life Insurance Co., Prudential Life Insurance Co., Equitable Life Assurance Society of America, as well as leading banks. In addition to Monroe Park, these projects include River Point Apartments, Norfolk, Va.; Silver Hills Apartments, Prince George Co., Maryland; Penn Manor, Pennsauken, N. J.; River Drive Apartments, Newport News, Va.

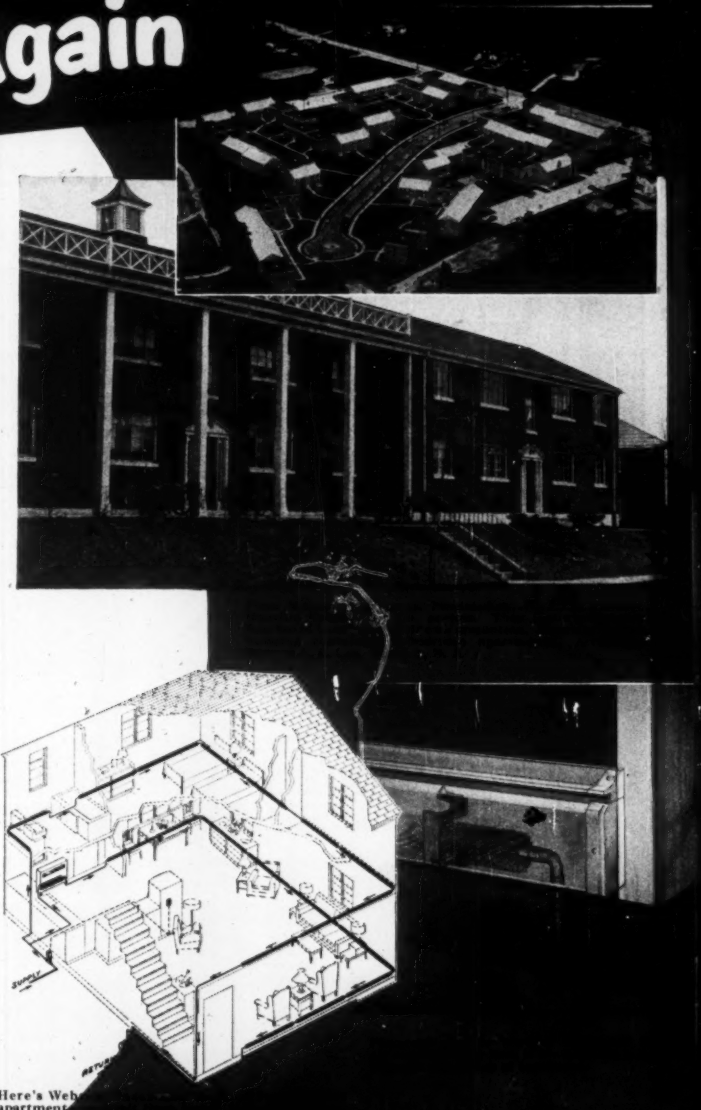
Investigate the possibilities of Webster Baseboard Heating for your garden apartment project. See what true *perimeter* forced hot water heating will add in sales appeal. Booklet "Questions and Answers about Webster Baseboard Heating" available on request.

Address Dept. HP-1

WARREN WEBSTER & CO. Camden 5, N.J.

Representatives in Principal Cities

In Canada, Darling Brothers, Ltd., Montreal



Here's Web
apartment
1949 NAH

Webster
BASEBOARD HEATING

Bryant Model 322 Unit Heater with A.G.A. inputs of 110, 135, 175, 210 thousand Btu per hour.

How to cut maintenance *Overhead*

Best bet for your industrial or commercial heating installation is *the* unit heater you can sell on the basis of *least maintenance.* That's where your customer looks for long-range economy and lasting satisfaction.

Tell him of the trouble-free operation of Bryant Gas Unit Heaters . . . how their specifically designed unit heater controls eliminate failures . . . how proper heat exchanger design prevents burnouts and squeezes a maximum of heat from every dollar's worth of fuel . . . how simple, timesaving installation of these Bryants meets his needs for comfort heating that's quick, automatic and without waste. These advantages mean *savings* for him.

And, once installed, you can count on these Bryant Unit Heaters for fewer call-backs . . . less trouble *overhead.* That's money in the bank for *you!*

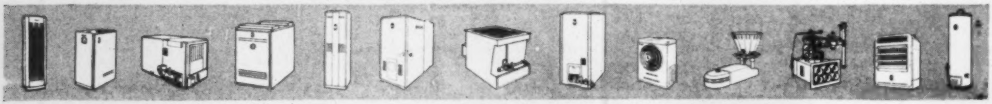
For a more complete story, contact the Bryant Distributor nearest you or write direct. Bryant Heater Division, Dept. 151, Affiliated Gas Equipment, Inc., 17825 St. Clair Ave., Cleveland 10, O.

Let the pup be furnace man
... and water boy, too!

bryant

AUTOMATIC HEATING

Your *single* source of supply for everything in gas heating equipment!



DO NOT FREEZE UP
S/S

What if it is freezing cold—your exposed steam traps won't cause you any worry if they're Yarway.

Yarway Impulse Steam Traps don't freeze because condensate does not accumulate. The only moving part—a little valve—is continually testing for condensate and passing it as soon as it forms. It never waits for a trapful to collect. Hence, there's never anything to freeze.

There are other good reasons, too, why more than 650,000 Yarways have been bought for both indoor and outdoor installations.

They get equipment *hotter, sooner.* They are *small in size, light in weight, easy to install and maintain.* They are *good for all pressures.* Construction is *stainless steel.*

Prove these advantages in your own plant at our expense. Try a Yarway *for free.* Call your nearby Yarway distributor or write direct to . . .

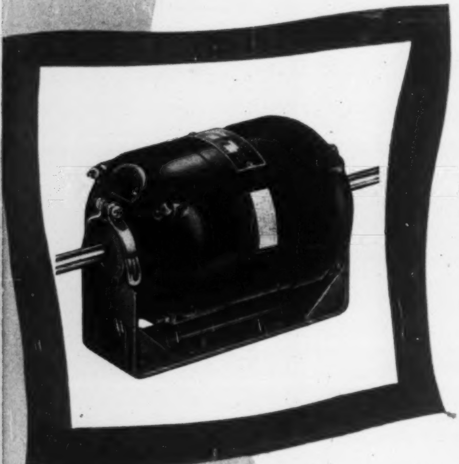
YARNALL-WARING COMPANY
107 Mermaid Avenue, Philadelphia 18, Pa.
BRANCH OFFICES IN PRINCIPAL CITIES

Stainless Steel Body
YARWAY IMPULSE STEAM TRAP

RAYTHEON

fractional hp motors

dependable performance



TYPE 470 Shaded 6-Pole, 1/15 up to 1/8 hp at 1050 rpm. NEW PRINCIPLE design provides highest efficiency at lower cost—about 1/2 the cost of comparable capicator motors, 2/3 the cost of split phase motors, while retaining high quality frame design in the same ratings. Furnished with single-speed, two or three-speed tapped windings for fan or blower operation. Write for Bulletin 4000.

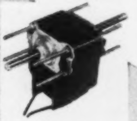
"Count on Raytheon to run it." Design engineers have learned to rely on Raytheon fractional hp motors when they want to *run* things—for example, FANS, BLOWERS and AIR CONDITIONING EQUIPMENT.

Raytheon Creative Craftsmanship assures *Dependable Performance* at the shaft—the kind of trouble-free power unit that manufacturers need in today's competitive markets.

Call in your Raytheon representative for consultation on your specific application.

RAYTHEON Type 230 Shaded 2-pole 1/200 to 1/50 hp at 3200 rpm motor.

RAYTHEON Type 330-S Shaded 4-pole 1/200 to 1/10 hp 1550 rpm motor.



RAYTHEON Type 350 Shaded 2-pole, 1/40 to 1/6 hp at 3000 rpm motor.

R

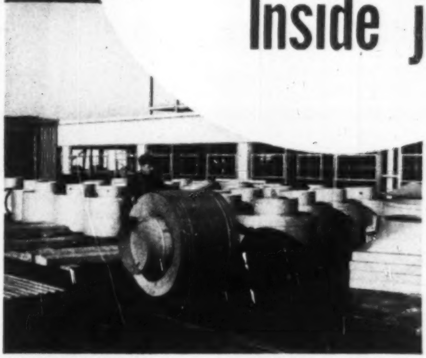
RUSSELL ELECTRIC COMPANY

SUBSIDIARY OF RAYTHEON MANUFACTURING CO.

4501 So. Western Boulevard Dept. A-28 Chicago 9, Illinois

Outside proof of a *Good* Inside job

These roof ventilators for a large factory building in western Pennsylvania were fabricated and erected by the Limbach Company, Pittsburgh.



"Mass Production" of a large number of identical roof ventilators like these calls for good workmanship and good materials. That's why many shops prefer U·S·S Galvanized for such work.

No matter what the job, you can count on superior shop performance when you use U·S·S Galvanized Sheets.

● Because they are constantly exposed to rain, sleet, snow, wind and corrosive atmospheric conditions, roof ventilators offer a severe test for galvanized steel sheets.

That's why, for ventilator construction and in fact for all outdoor applications,* U·S·S Galvanized Steel Sheets are so universally preferred.

In U·S·S Galvanized Sheets are combined all the qualities you need to turn out sheet metal work as neat as the job shown here—and as sturdy and durable as you could possibly want.

U·S·S Galvanized Sheets do not vary in finish or quality. They're uniform in surface, flatness and ductility. Their uniform, tightly adhering coating of zinc lends itself to the most difficult fabricating or forming operations, thereby preserving high resistance to corrosion.

You'll find, too, that these superior sheets are easy to handle. You can bend, roll, cut and stamp them with the best of results—advantages which mean faster shop time, worthwhile material savings, and better sheet metal work.

For outside jobs such as ventilators, skylights, cornices and gutters, stock U·S·S Galvanized Steel Sheets for the average job, and U·S·S Galvanized Copper Steel Sheets where atmospheric conditions are more severe.

*Their superior ability to meet outdoor conditions makes them equally desirable for construction indoors.

COLUMBIA STEEL COMPANY, SAN FRANCISCO · TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM · UNITED STATES STEEL COMPANY, PITTSBURGH
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

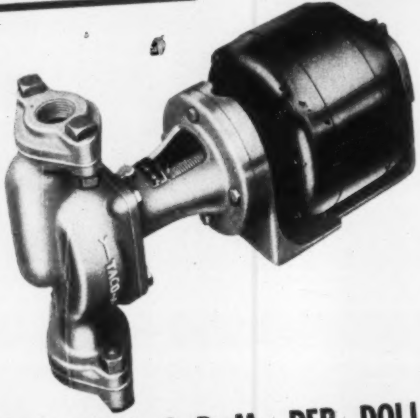
USS TRADE MARK **GALVANIZED STEEL SHEETS**

0-130

UNITED STATES STEEL

Get more for

TACO HORIZONTAL CIRCULATORS

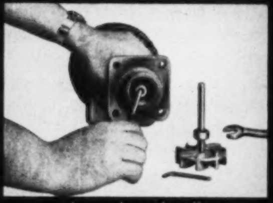


1. **THEY PUMP MORE G. P. M. PER DOLLAR ON SMALL JOBS** This is important on today's modern small pipe radiant heating jobs (radiators, convectors, base boards or panels).

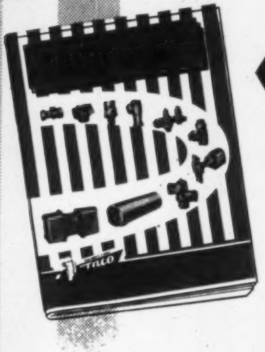
2. **LESS INVENTORY** Interchangeable flanges mean one circulator plus four sets of flanges (¾", 1", 1¼" and 1½") equals four sizes of circulators in stock.

3. **EXTRA CAPACITY** You get full 1½" capacity in all sizes (¾", 1", 1¼" and 1½").

LOOK HOW EASY IT IS TO SERVICE



To change seals on the job, all you need is an open end wrench, screwdriver and allenset screw wrench. Taco's carbon seal runs against a stainless steel seal eliminating any wear in bracket.



your money with...

TACO'S NEW HORIZONTAL FLOCHEK

TACO
OPEN
NORMAL
CLOSED

... does these three things right:

1. **SEATS TIGHT**
   Hand lapping does it.
2. **CLEANS EASY**
   Just jiggle adjusting arm.
3. **INSTALLS SMALL**
   Goes into low ceilinged space. Fine for new small homes.

SEND FOR TACO'S NEW 60 PAGE CATALOG

Use postage paid post card above

Catalog has a special design section on Panel Heating, Snow Removal and forced hot water.

Better Heating-Better with Taco

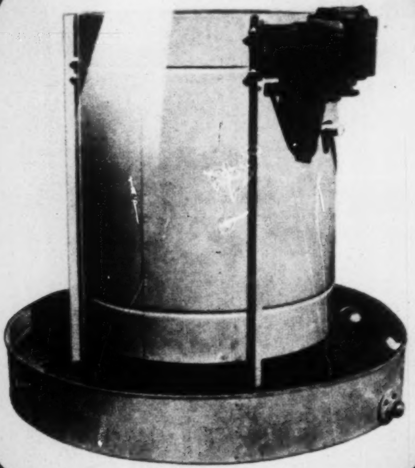
Taco

TACO HEATERS, INCORPORATED
137 South St., Providence 3, R. I.

An Engineering Achievement

the new

LILIE-HOFFMANN PACKAGE COOLING TOWER



NEW IN DESIGN
•
NEW HIGHER PERFORMANCE
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LOW OPERATING COST

LOW INITIAL COST
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LOW MAINTENANCE COST
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CONVENIENT PACKAGE UNIT

LILIE-HOFFMANN COOLING TOWERS

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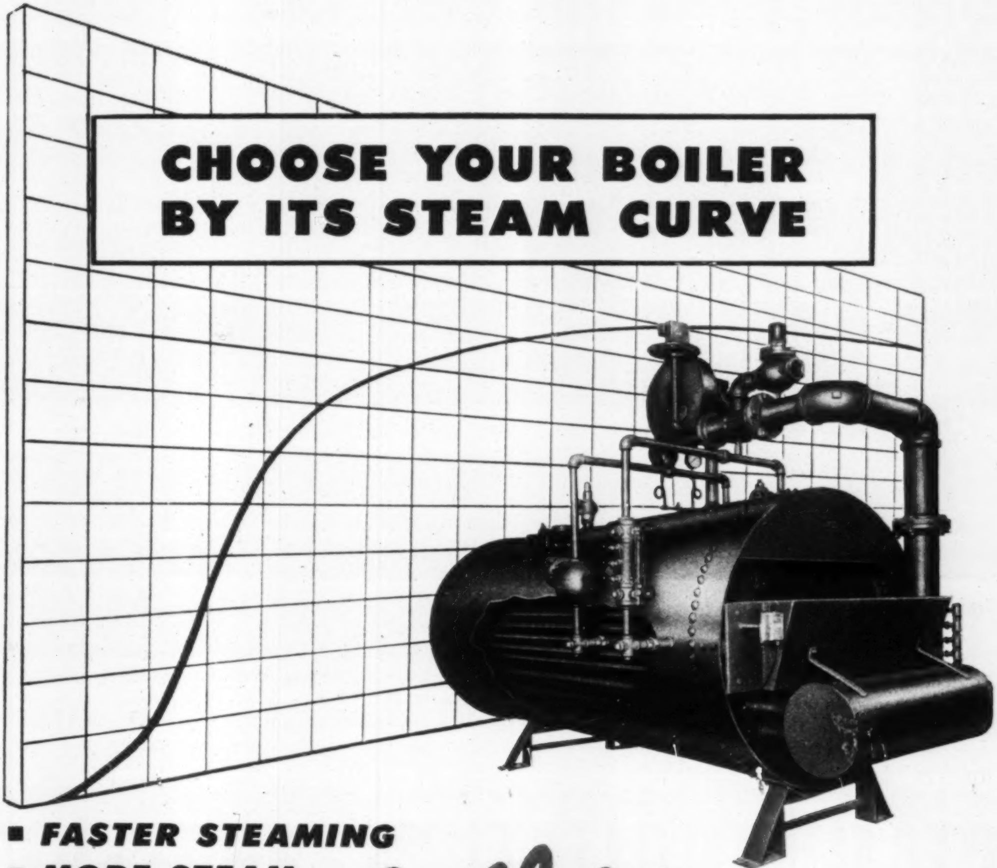
Write for Bulletin PCT-750. Sizes up to 50 tons
For larger sizes write for our bulletin LD-650 (175 tons)

CHOOSE YOUR BOILER BY ITS STEAM CURVE



- ***FASTER STEAMING***
- ***MORE STEAM***
- ***DRY STEAM***

with Sellers IMMERSION STEAM BOILER

You buy a boiler for just one thing — to produce **steam.** You want **dependable** steam production and you want it at the **lowest** possible cost. The Sellers immersion firing principle gives you more steam, dry steam, faster steaming, plus lower operating cost and lower maintenance. Here are the basic advantages in Sellers design which gives you these results:

1. The firing tubes in a Sellers are completely submerged. Every atom of heat goes directly into the water — Result: Maximum heating efficiency.
2. The water surface area is nearly three times that of a conventional boiler of comparable capacity. This means faster steaming and dry steam because surging is eliminated. No water line corrosion.
3. Scale can't build up to interfere with heat transfer. Lime deposits on the outside of the firing tubes are automatically cracked off and fall to the bottom of the shell, as the tubes expand and contract with intermittent firing.

Whether you require steam for heating or process purposes, it will pay you to carefully investigate the Sellers Immersion Steam Boiler. Available in twelve sizes to meet all standard requirements. All are built to A.S.M.E. Power Codes. Our Bulletin No. 1206-C will give you full details. Write for it today.

SELLERS ENGINEERING COMPANY

4876 North Clark Street **Chicago 40, Illinois**

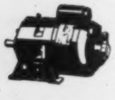
Blast Heaters. Immersion Automatic Water Heaters. Vertical Steam Boilers. Air Heaters. Combustion Units. Industrial Gas Burners. Immersion Tank Heaters. Gas Combustion Equipment

"**Design simplicity** is the biggest advantage we get by using standardized fractional-hp motors," says R. A. Preston, chief design engineer with the Tecumseh Products Company. "By adhering to these standards, we can often eliminate costly construction details. **It's** easier to select the exact motor we need, too, when we know ***in advance*** what the motor characteristics are."

"**Customer satisfaction** is an asset we prize very highly," says H. S. Mulhollen, vice president and general sales manager of the Essick Manufacturing Company. "One way we keep our customers satisfied is to give our distributors a workable motor exchange and service plan, something we can do effectively by using standardized fractional-hp motors on our products."

STANDARDIZATION can make

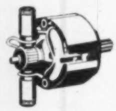
STANDARDIZED FRACTIONAL HORSEPOWER MOTORS



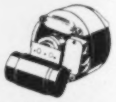
Gear-Motors

Home Laundry

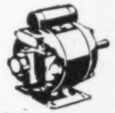
Sump Pump



Series Motors

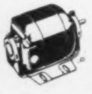


Shaft-Mounted Fan

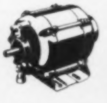


General Purpose

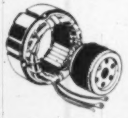
Jet Pump



Belted Fan

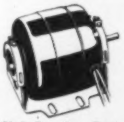


Gas Pump



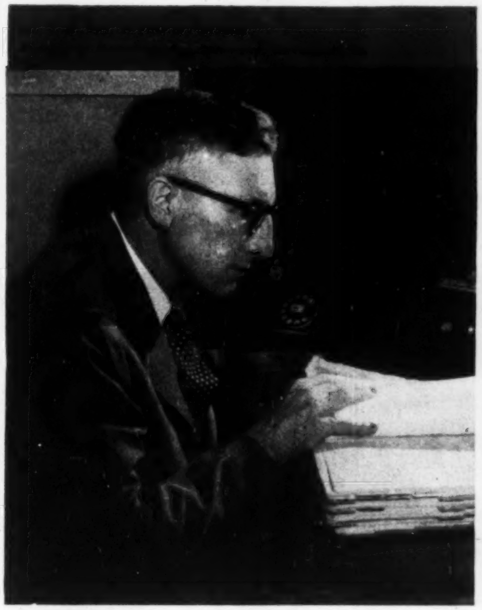
Hermetic Refrigeration

Oil Burner



Unit-Bearing Fan

Want experienced application engineering help in using these and other G-E standardized motors? It's yours for the asking!



"**Less detail work** is what I like about using standardized fractional-hp motors" says J. A. Fell, director of purchases of the Red Jacket Manufacturing Company, manufacturers of pumps and water systems. "With motor characteristics and mounting dimensions now on a uniform basis, there is more opportunity to buy 'right out of the catalog.' Inventory problems are simpler and we get much better delivery."

"**Flexibility** is what we gain by using standardized fractional-hp gear motors," says J. Welker, plant manager of the Milton Roy Pump Company. "Two frame sizes take care of all our ratings which saves assembly time and simplifies purchasing. With our gear-motor supplier carrying standardized motor parts, we get prompt delivery."

your job easier, too!

Can standardization cut your motor costs?

It's surely worth your while to find out! And it's easy—just fill out the coupon and we'll furnish the facts you need to make a decision. For more details on what standardization of small motors covers, ask for Bulletin GES-3565. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

☐ **I'd like to talk** to one of your fractional-horsepower motor specialists about the possibility of using standardized motors. My product is .... Its motor requirements are .... Other special requirements are ....

☐ Just send me a copy of your Bulletin GES-3565, for reference purposes.

NAME ____________________

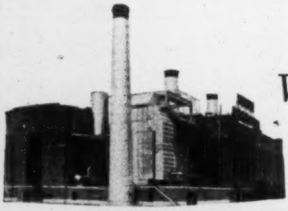
COMPANY ____________________

ADDRESS ____________________

CITY ____________ STATE ____________

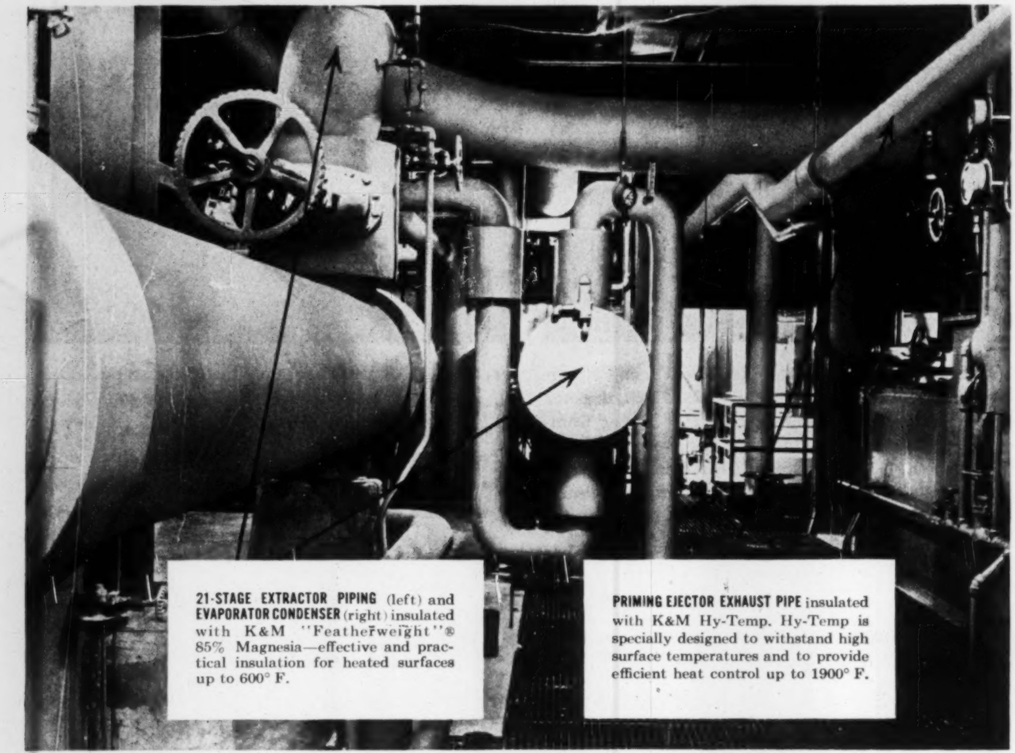
GENERAL ELECTRIC

700-108



Where the best in insulation is a must

Public Service Co. of Oklahoma uses
K&M Insulations in Weleetka Power Station



21-STAGE EXTRACTOR PIPING (left) and **EVAPORATOR CONDENSER** (right) insulated with K&M "Featherweight"® 85% Magnesia—effective and practical insulation for heated surfaces up to 600° F.

PRIMING EJECTOR EXHAUST PIPE insulated with K&M Hy-Temp. Hy-Temp is specially designed to withstand high surface temperatures and to provide efficient heat control up to 1900° F.

Insulation Contractor: Armstrong Cork Company

These K&M insulations keep steam hotter—longer—at less cost!

In power stations, oil refineries, chemical plants, factories, steamships, hospitals—in fact, wherever exacting steam control is a must—you'll find K&M "Featherweight" 85% Magnesia and K&M Hy-Temp Insulations. These two K&M products give you highly efficient, cost-cutting insulation in every service temperature range. And, for especially difficult heat control situations, the advantages of both are combined in K&M Hy-Temp Combination Insulation.

Your Keasbey & Mattison Distributor—who is an experienced applicator—will be glad to give you complete information on these or any K&M Insulations. Or, write us.

Nature made Asbestos...

Keasbey & Mattison has made it serve mankind since 1873

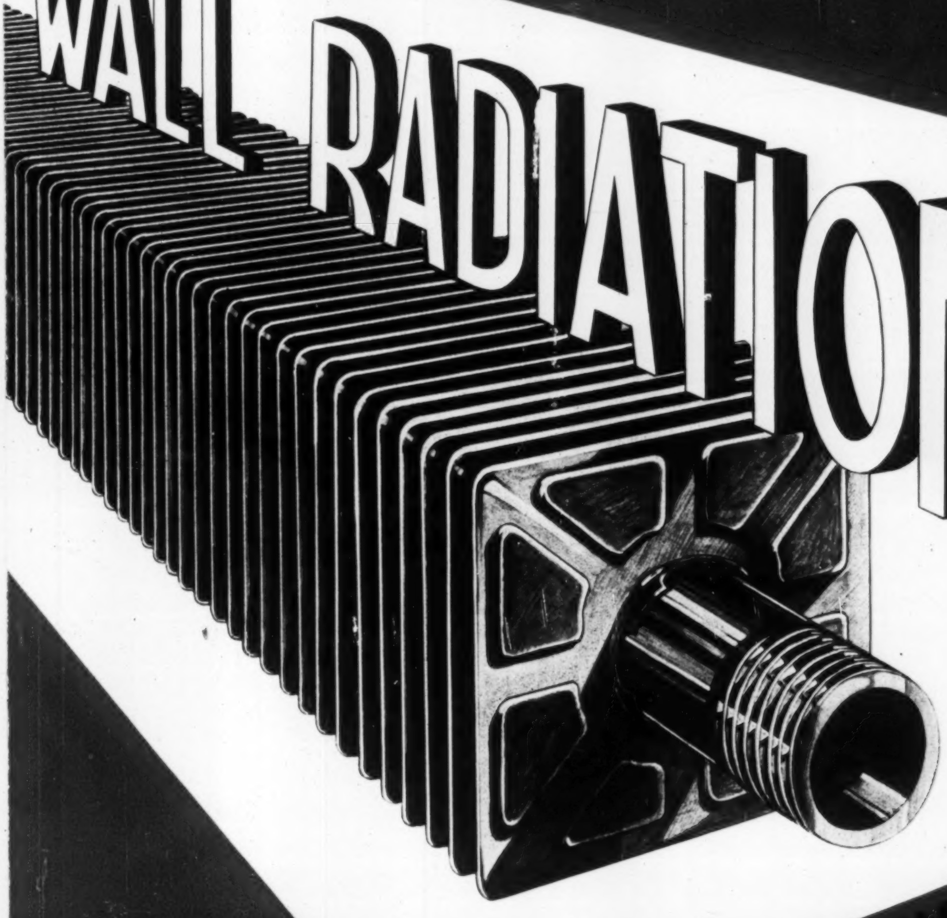
K&M best in asbestos ®

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

fedders

A Great Name Since 1896

WALL RADIATION



FEDDERS-QUIGAN CORPORATION
BUFFALO 7,
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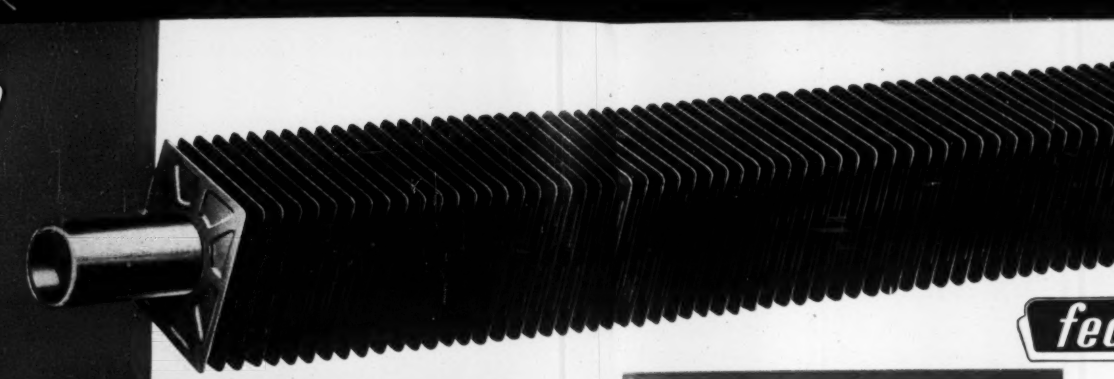
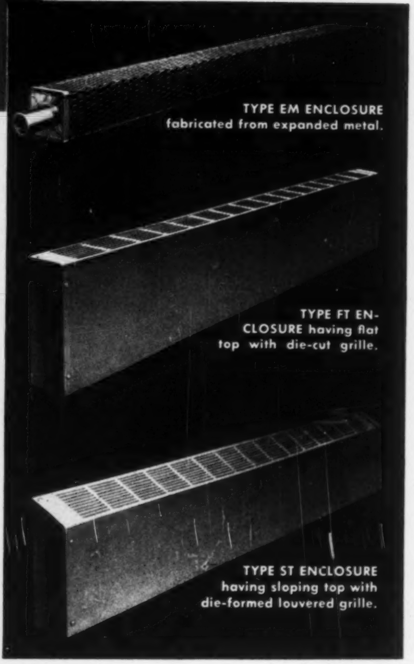
A Great Name Since 1896

WALL RADIATION





TYPE EM ENCLOSURE fabricated from expanded metal.

TYPE FT ENCLOSURE having flat top with die-cut grille.

TYPE ST ENCLOSURE having sloping top with die-formed louvered grille.

APPLICATIONS

Fedders Wall Radiation is well adapted for industrial, commercial, and institutional buildings. They also have many economical residential applications in heating entire homes and apartments.

Due to their high heat transfer efficiency per lineal foot, they occupy far less space than pipe coils or bulky cast iron radiators.

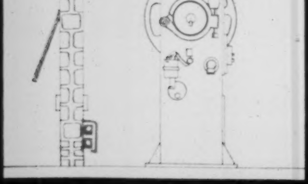
High heat transfer and aerodynamic efficiency of Fedders Wall Radiation results in space-saving installations . . . light weight for easy handling . . . low cost for exposed or concealed radiation. They can be used as the complete radiation system, or installed in conjunction with Fedders Unit Heaters or other equipment, as layout or heating load conditions require.

The high heat transfer output of Fedders Wall Radiation is based on use of cold drawn, seamless steel, pressure type tubing bullet expanded into self-spacing, collared, die-formed steel fins.

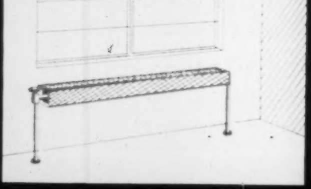
Collared fins provide larger fin-to-tube contact compared to usual line contact fins. This increases the amount of heat transfer. Die-formed pattern adds turbulence and scrubbing action to air flow, plus added fin strength.

They are easily cleaned, — a heat transfer advantage and maintenance economy in dust-laden conditions encountered in textile mills, foundries, flour, feed and food processing plants.

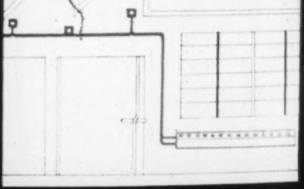
Showing how Fedders Wall Radiation can be spotted to kill cold spots adjacent to working areas.



Drafts from windows and exposed walls are eliminated by locating Fedders Wall Radiation under windows or along walls.



More uniform temperatures can be maintained by locating Fedders Wall Radiation at points where drafts begin.



fed

CONVENIENCE

Fedders design provides a highly efficient heat transfer surface that is easy to stock, easy to handle, easy to deliver and easy to install on the job. Weights are measured in pounds instead of tons.

QUICK RESPONSE

Fedders Wall Radiation provides quick response to manual or thermostatic control. This contributes to uniform temperatures. Fuel economy is further increased by fast warm-up after weekend shutdowns, and when sudden outdoor weather changes occur.

STEAM CAPACITY PER F

60 F ENTE

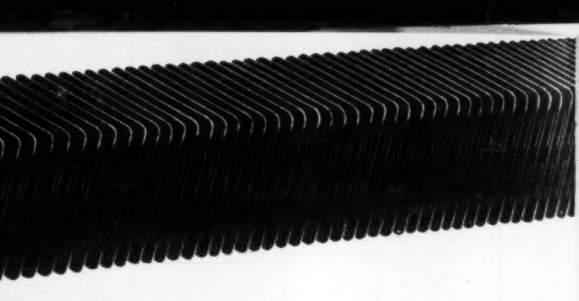
	Rows High	LESS ENCLOSUR	
		Btu hr	EDR
1¼" Pipe 50 Fins Per Ft	1	1410	5.87
	2	2540	10.60
	3	3380	14.10
	4	4520	18.85
1¼" Pipe 38 Fins Per Ft	1	1160	4.84
	2	2085	8.70
	3	2780	11.60
	4	3710	15.45
2" Pipe 24 Fins Per Ft	1	1390	5.80
	2	2500	10.40
	3	3320	13.82
	4	4440	18.50

NOTE:—240 Btu = 1 EDR.

It is good installation practice to limit length for 2 lb. or greater supply pressure. Longer

HOW TO ORDER - -

1. Specify pipe size and fin spacing desired.
2. State desired length of heating element in accordance with roughing in dimensions on page 6. Radiation longer than 12 ft. furnished from various stock lengths for convenient shipping and assembly on the job.
3. Specify choice of threaded or bevelled ends.



edders

HOOK-UPS

Lengths from 2′ to 12′ in 6″ increments are available with 1¼″ and 2″ nominal pipe sizes. 38 and 50 fins per foot available on 1¼″ pipe, and 24 fins per foot available on 2″ pipe.

Choice of threaded ends for standard pipe connections or plain ends bevelled for welding on the job.

COVERS

Expanded steel mesh, or solid front having flat or sloping top with die cut grille. Butt and corner joining strips available as specified. Solid front covers act as convectors giving a stack effect which increases capacity.

Covers are finished with one-coat of primer. Heating element is finished in one coat of neutral paint.

FOOT OF LENGTH

TERING AIR **1 PSI STEAM**

RE	ENCLOSURE					
	TYPE EM		TYPE FT		TYPE ST	
R	Btu hr	EDR	Btu hr	EDR	Btu hr	EDR
37	1350	5 63	1370	5 70	1390	5 80
60	2440	10 16	2800	11 67	2920	12 18
0	3240	13 50	4060	16 90	4220	17 55
35						
34	1115	4 65	1130	4 70	1140	4 75
70	2015	8 42	2295	9 56	2400	10 00
60	2670	11 12	3340	13 90	3470	14 45
5						
30	1335	5 55	1350	5 62	1360	5 67
60	2400	10 00	2750	11 45	2880	12 00
32	3190	13 30	3990	16 60	4140	17 25
60						

th of runs to 100 ft. on 1 lb. differential pressure, and 150 ft. er runs should be hooked up to a separate supply and trap.

4. Advise number of hanger brackets required.

When enclosure is desired, specify type, length and height.

TYPE EM Enclosure made of expanded metal.

TYPE FT Enclosure has solid front and flat top.

TYPE ST Enclosure has sloping top with die-formed grille.

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fedders WALL RADIATION

HOT WATER

CAPACITY PER FOOT OF LENGTH

60 F ENTERING AIR

AVERAGE WATER TEMPERATURE 160 F

	Rows High	LESS ENCLOSURE Btu/hr	ENCLOSURE		
			TYPE EM Btu/hr	TYPE FT Btu/hr	TYPE ST Btu/hr
1¼″ Pipe 50 Fins Per Ft	1	650	625	630	640
	2	1170	1130	1290	1345
	3	1555	1495	1870	1940
	4	2080			
1¼″ Pipe 38 Fins Per Ft	1	535	515	520	525
	2	960	930	1055	1110
	3	1280	1230	1540	1600
	4	1705			
2″ Pipe 24 Fins Per Ft	1	640	615	625	635
	2	1155	1110	1280	1330
	3	1525	1470	1840	1905
	4	2045			

AVERAGE WATER TEMPERATURE 170 F

	Rows High	LESS ENCLOSURE Btu/hr	ENCLOSURE		
			TYPE EM Btu/hr	TYPE FT Btu/hr	TYPE ST Btu/hr
1¼″ Pipe 50 Fins Per Ft	1	735	705	710	725
	2	1320	1270	1460	1520
	3	1760	1690	2120	2200
	4	2360			
1¼″ Pipe 38 Fins Per Ft	1	605	580	590	600
	2	1090	1050	1195	1255
	3	1450	1380	1740	1810
	4	1940			
2″ Pipe 24 Fins Per Ft	1	724	695	705	715
	2	1305	1250	1445	1500
	3	1720	1660	2080	2170
	4	2315			

AVERAGE WATER TEMPERATURE 180 F

	Rows High	LESS ENCLOSURE Btu/hr	ENCLOSURE		
			TYPE EM Btu/hr	TYPE FT Btu/hr	TYPE ST Btu/hr
1¼″ Pipe 50 Fins Per Ft	1	825	815	820	825
	2	1480	1420	1630	1700
	3	1970	1880	2370	2460
	4	2630			
1¼″ Pipe 38 Fins Per Ft	1	675	650	660	665
	2	1215	1180	1350	1400
	3	1620	1550	1950	2030
	4	2160			
2″ Pipe 24 Fins Per Ft	1	810	780	790	800
	2	1460	1405	1625	1675
	3	1935	1860	2330	2420
	4	2600			

fedders WALL RADIATION

HOT WATER

CAPACITY PER FOOT OF LENGTH

60 F ENTERING AIR

AVERAGE WATER TEMPERATURE 190 F

	Rows High	LESS ENCLOSURE Btu/hr	ENCLOSURE TYPE EM Btu/hr	ENCLOSURE TYPE FT Btu/hr	ENCLOSURE TYPE ST Btu/hr
1¼" Pipe 50 Fins Per Ft	1	915	880	890	900
	2	1650	1580	1810	1895
	3	2190	2100	2640	2730
	4	2930			
1¼" Pipe 38 Fins Per Ft	1	750	725	730	740
	2	1350	1310	1490	1560
	3	1800	1730	2160	2250
	4	2400			
2" Pipe 24 Fins Per Ft	1	900	870	880	890
	2	1620	1560	1800	1870
	3	2150	2070	2580	2670
	4	2880			

AVERAGE WATER TEMPERATURE 200 F

	Rows High	LESS ENCLOSURE Btu/hr	ENCLOSURE TYPE EM Btu/hr	ENCLOSURE TYPE FT Btu/hr	ENCLOSURE TYPE ST Btu/hr
1¼" Pipe 50 Fins Per Ft	1	1010	965	980	990
	2	1810	1740	2000	2080
	3	2410	2310	2900	3000
	4	3220			
1¼" Pipe 38 Fins Per Ft	1	825	800	810	815
	2	1490	1440	1640	1720
	3	1980	1900	2380	2480
	4	2640			
2" Pipe 24 Fins Per Ft	1	990	955	960	975
	2	1790	1720	1960	2060
	3	2360	2280	2850	2950
	4	3170			

AVERAGE WATER TEMPERATURE 215 F

	Rows High	LESS ENCLOSURE Btu/hr	ENCLOSURE TYPE EM Btu/hr	ENCLOSURE TYPE FT Btu/hr	ENCLOSURE TYPE ST Btu/hr
1¼" Pipe 50 Fins Per Ft	1	1150	1100	1120	1135
	2	2070	1990	2280	2380
	3	2750	2640	3310	3430
	4	3680			
1¼" Pipe 38 Fins Per Ft	1	945	910	920	930
	2	1700	1640	1870	1960
	3	2265	2170	2720	2830
	4	3020			
2" Pipe 24 Fins Per Ft	1	1130	1090	1100	1120
	2	2040	1960	2240	2350
	3	2700	2600	3250	3370
	4	3620			

FEDDERS - QUIGAN CORPORATION, BUFFALO 7, N. Y.

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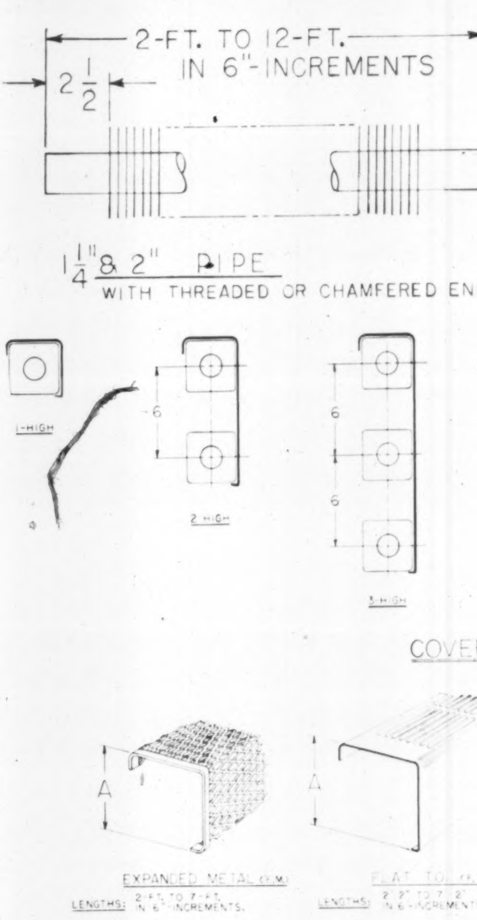
SPECIFICATIONS AN


2-FT. TO 12-FT.
IN 6"-INCREMENTS
2 1/2
1 1/4" & 2" PIPE
WITH THREADED OR CHAMFERED EN
1-HIGH
6
2-HIGH
6
6
3-HIGH
COVE
A
A
EXPANDED METAL (E.M.)
LENGTHS: 2-FT. TO 7-FT. IN 6"-INCREMENTS.
FLAT TO
LENGTHS: 2' 2" TO 7' 2" IN 6"-INCREMENT

DISTANCE FROM WALL TO FACE OF COVER

COVER TYPE	1-HIGH EM	1-HIGH FT	1-HIGH ST	2-HIGH EM	2-HIGH FT	2-HIGH ST	3-HIGH EM	3-HIGH FT	3-HIGH ST
1¼" Pipe	$4\frac{3}{16}$	$4\frac{1}{8}$	$4\frac{1}{8}$	$4\frac{3}{16}$	$4\frac{1}{8}$	$4\frac{1}{8}$	$4\frac{3}{16}$	$4\frac{1}{8}$	$4\frac{1}{8}$
2" Pipe	5	$4\frac{7}{8}$	$4\frac{7}{8}$	5	$4\frac{7}{8}$	$4\frac{7}{8}$	5	$4\frac{7}{8}$	$4\frac{7}{8}$

The Fedders-Quigan policy is one of continuous improvement, and t

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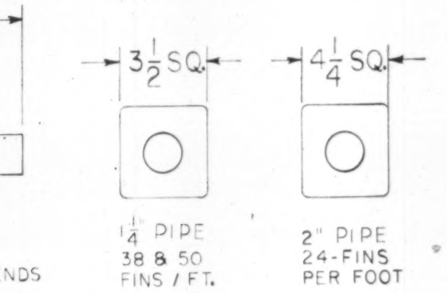
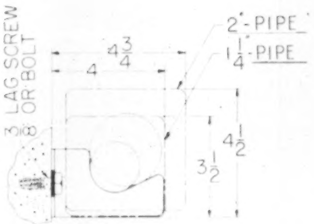
BUFFALO 7, N

ALL RADIATION

ND DIMENSIONS

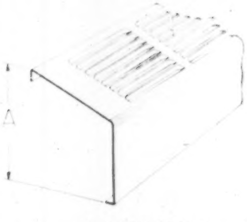


3½ SQ.
1¼" PIPE
38 & 50
FINS / FT.
4¼ SQ.
2" PIPE
24-FINS
PER FOOT
NDS



2"-PIPE
1¼"-PIPE
⅜ LAG SCREW OR BOLT
4¾
4
4½
3½

ERS



SLOPING TOP (S.T.)
LENGTHS: 2-FT. TO 7-FT. IN 4"-INCREMENTS.

"A" DIMENSION

COVER TYPE	1-HIGH			2-HIGH			3-HIGH		
	EM	FT	ST	EM	FT	ST	EM	FT	ST
1¼" Pipe	3⅞	3¾	6½	9⅞	9¾	12½	15⅞	15¾	18½
2" Pipe	4⅝	4½	7⅝	10⅝	10½	13⅝	16⅝	16½	19⅝

d therefore the right is reserved to make changes without notice

CORPORATION
.Y. U. S. A.

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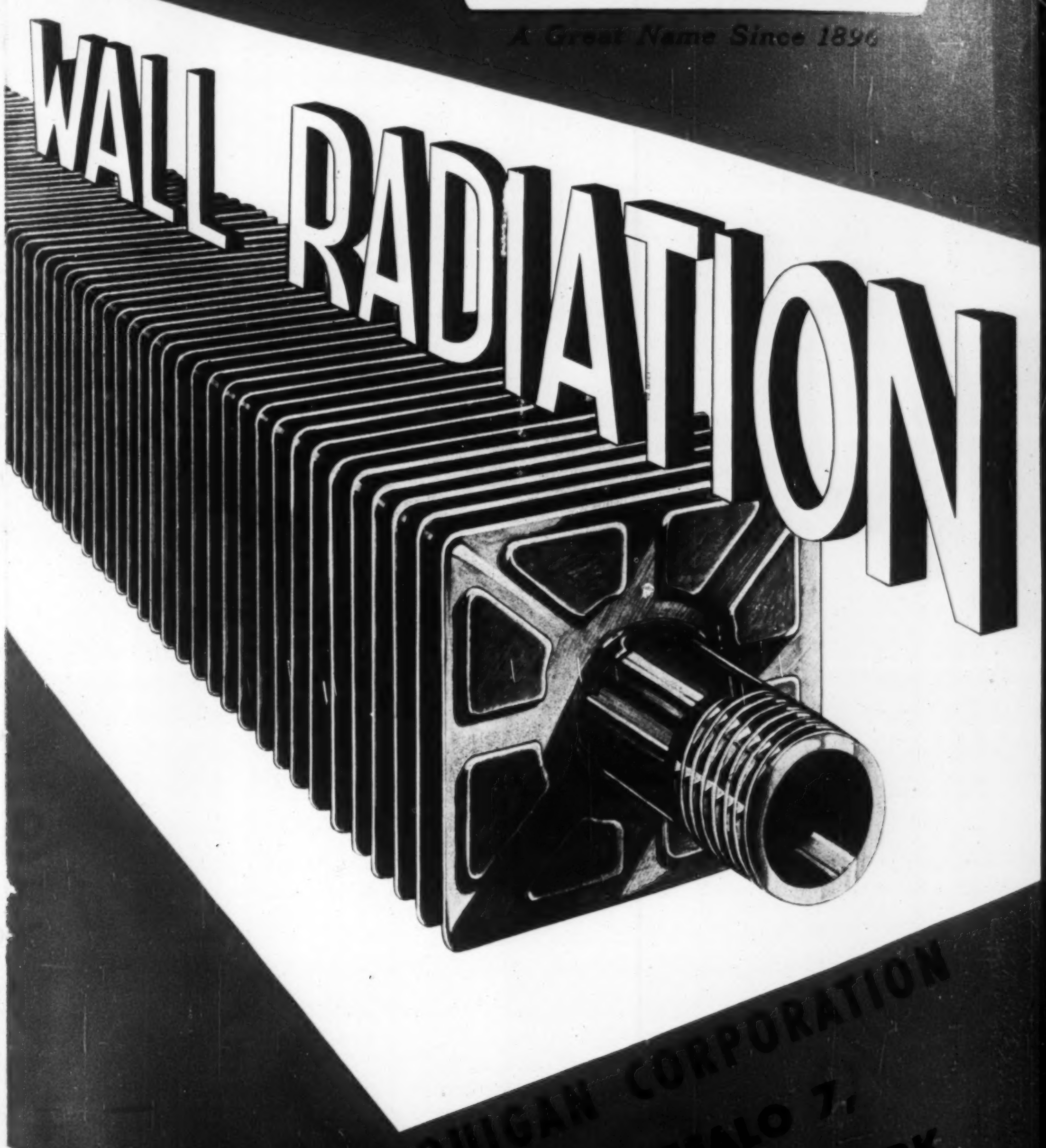

WALL RADIATION

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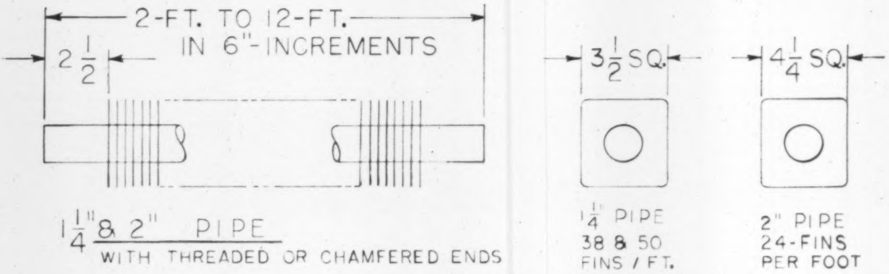
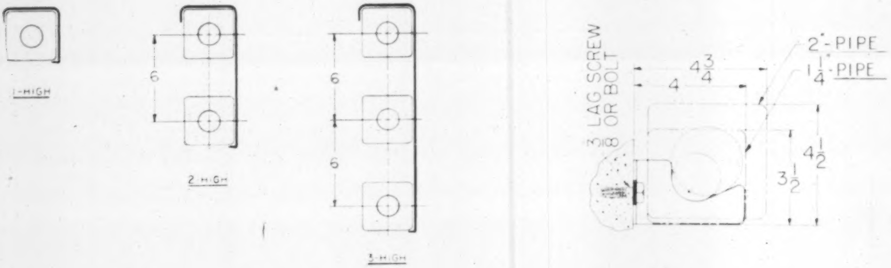
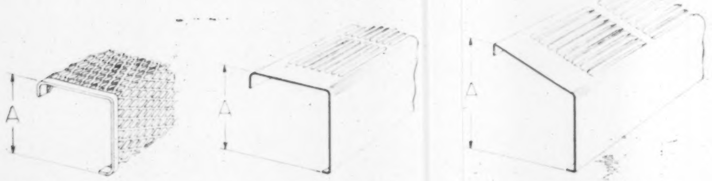
WALL RADIATION

SPECIFICATIONS AND DIMENSIONS


2-FT. TO 12-FT. IN 6"-INCREMENTS
2 1/2
3 1/2 SQ.
4 1/4 SQ.
1 1/4" & 2" PIPE WITH THREADED OR CHAMFERED ENDS
1 1/4" PIPE 38 & 50 FINS / FT.
2" PIPE 24-FINS PER FOOT


1-HIGH
6
2-HIGH
6
6
3-HIGH
3/8 LAG SCREW OR BOLT
4
4 3/4
2"-PIPE
1 1/4"-PIPE
4 1/2
3 1/2

COVERS



EXPANDED METAL (E.M.)
LENGTHS: 2-FT. TO 7-FT. IN 6"-INCREMENTS.

FLAT TOP (F.T.)
LENGTHS: 2'-2" TO 7'-2" IN 6"-INCREMENTS.

SLOPING TOP (S.T.)
LENGTHS: 2-FT. TO 7-FT. IN 4"-INCREMENTS.

DISTANCE FROM WALL TO FACE OF COVER

COVER TYPE	1-HIGH			2-HIGH			3-HIGH		
	EM	FT	ST	EM	FT	ST	EM	FT	ST
$1\frac{1}{4}$" Pipe	$4\frac{3}{16}$	$4\frac{1}{8}$	$4\frac{1}{8}$	$4\frac{3}{16}$	$4\frac{1}{8}$	$4\frac{1}{8}$	$4\frac{3}{16}$	$4\frac{1}{8}$	$4\frac{1}{8}$
2" Pipe	5	$4\frac{7}{8}$	$4\frac{7}{8}$	5	$4\frac{7}{8}$	$4\frac{7}{8}$	5	$4\frac{7}{8}$	$4\frac{7}{8}$

"A" DIMENSION

COVER TYPE	1-HIGH			2-HIGH			3-HIGH		
	EM	FT	ST	EM	FT	ST	EM	FT	ST
$1\frac{1}{4}$" Pipe	$3\frac{7}{8}$	$3\frac{3}{4}$	$6\frac{1}{2}$	$9\frac{7}{8}$	$9\frac{3}{4}$	$12\frac{1}{2}$	$15\frac{7}{8}$	$15\frac{3}{4}$	$18\frac{1}{2}$
2" Pipe	$4\frac{5}{8}$	$4\frac{1}{2}$	$7\frac{5}{8}$	$10\frac{5}{8}$	$10\frac{1}{2}$	$13\frac{5}{8}$	$16\frac{5}{8}$	$16\frac{1}{2}$	$19\frac{5}{8}$

The Fedders-Quigan policy is one of continuous improvement, and therefore the right is reserved to make changes without notice

FEDDERS-QUIGAN CORPORATION
BUFFALO 7, N. Y. U. S. A.

"Freedom of thought and independence of action . . ."

DONALD W. DOUGLAS

President, Douglas Aircraft Company, Inc.

"Freedom of thought and independence of action are among the keynotes of America's economy. They are fundamental to our way of life. Systematic savings through the Payroll Savings Plan help the individual maintain his own independence and freedom of action and make us strong as a nation."

In more than 21,000 large companies (employing 100 or more) and in many smaller companies, more than 8,000,000 men and women are helping to keep America strong. By systematic saving in U. S. Savings Bonds they are doing their part to offset inflationary tendencies . . . they are building a reservoir of future purchasing power to support industry...they are providing financial independence for themselves and their families.

The widespread success of the Payroll Savings Plan is an excellent example of our freedom of thought and independence of action. Far-sighted employers *offered* these 8,000,000 Americans an *opportunity* to enroll in the Payroll Savings Plan. There was no pressure, no emotional stimulation. A Payroll Savings Plan application was placed before them. They "signed up"—to the benefit of themselves, their companies and their country.

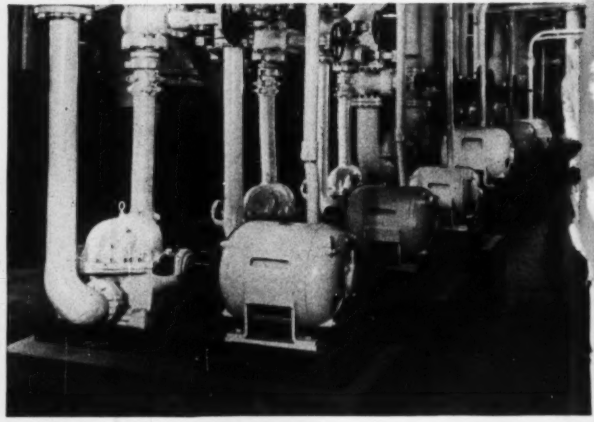
Has *every* man and woman in your company been *offered* an opportunity to share in the benefits of the Payroll Savings Plan? How about the newer employees? How about those who did not sign before but may wish to do so now? Delegate one of your top executives to conduct a person-to-person canvass of your employees to make sure that *every* man and woman gets an application blank. You don't have to urge them to enroll, or to increase their present allotment—they are anxious to build for their own independence.

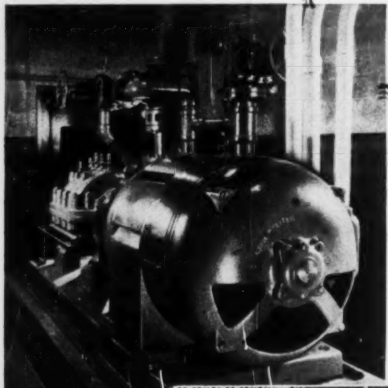
Get in touch with your State Director, U. S. Treasury Department, Savings Bonds Division. He is ready to help you—with a package plan that reduces your work to the minimum.

The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the G. M. Basford Company and

HEATING, PIPING & AIR CONDITIONING

In good buildings



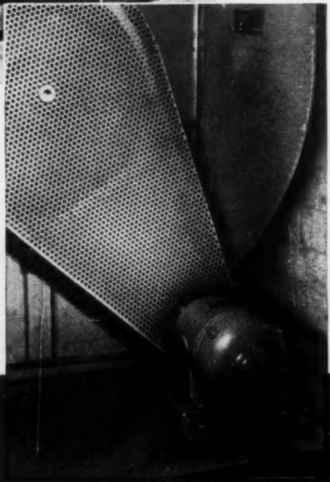


ABOVE — Three 60-hp, 3600-rpm and four 150-hp, 1800-rpm Elliott C-W motors driving pumps.

UPPER LEFT — An Elliott C-W 200-hp, 1800-rpm wound-rotor protected-type motor drives the main fire pump.

LOWER LEFT — This 5-hp, 1800-rpm motor is one of a number of Elliott C-W motors driving fans.

BELOW — Two 3-hp, 1200-rpm vertically mounted Elliott C-W motors with Type C face, driving sewage ejector pumps.



everywhere!

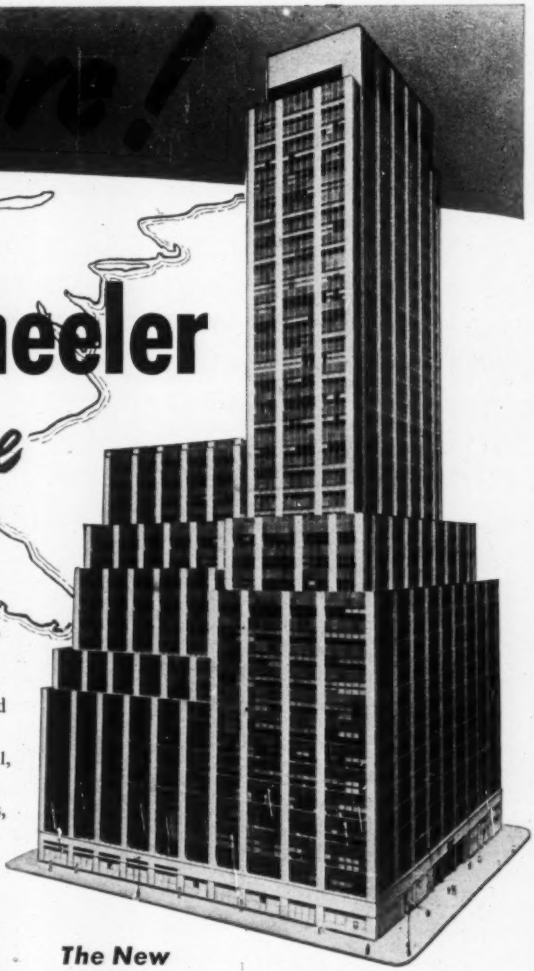
Crocker-Wheeler
Protected-Type
MOTORS

■ More and more you see them — driving pumps, fans, compressors and other equipment in heating and air conditioning systems. Crocker-Wheeler Protected-Type motors get the nod for their quiet, steady operation and low maintenance qualities. Their design provides full protection against common hazards such as moisture, oil, dust and grit. They're built throughout to assure long, dependable service with minimum upkeep. The bearings, for example, are double-row width, pre-lubricated and *sealed.* They'll go at least five years without attention.

Crocker-Wheeler Protected-Type motors are in good buildings everywhere because engineers and contractors recognize their advantages for building service. These advantages are fully covered in Bulletin SL-300-1A.

SEND FOR A COPY

Address your request to Elliott Company, Dept. H, Jeannette, Pa.



The New
100 Park Avenue Building, N. Y.

Towering high above mid-town, New York City, this completely air conditioned structure is an example of the latest in commercial buildings. Sixty Crocker-Wheeler motors are installed in the air conditioning system.

Kahn & Jacobs
Architects
George A. Fuller Co.
General Contractor

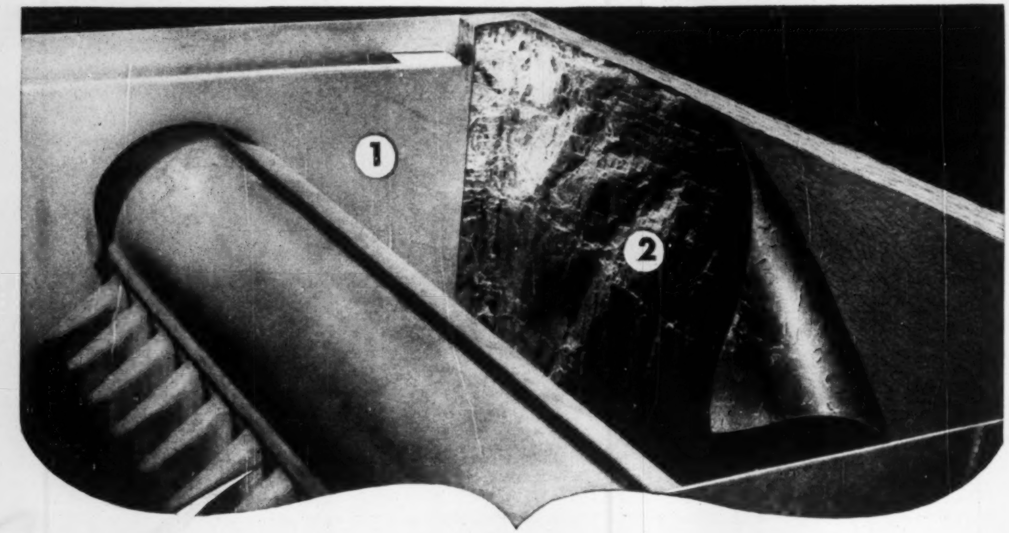
Jaros, Baum & Bolles
Mechanical & Electrical Engineers
Kerby Saunders, Inc.
Air Conditioning, Heating & Ventilating Contractor

Elliott C-W motors range from 1 to 200-hp. Larger Elliott motors and generators are built by the Ridgway Division in Ridgway, Pa.

CW-18

ELLIOTT
COMPANY

CROCKER-WHEELER DIVISION
Ampere, New Jersey
BRANCH OFFICES & REPRESENTATIVES IN PRINCIPAL CITIES
ELLIOTT Approved SERVICE SHOPS COVER THE COUNTRY

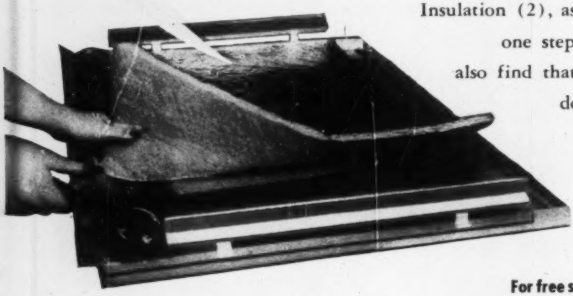


New furnace insulation method saves steel!

**Foil-faced ULTRALITE Insulation replaces baffle plate;
saves time and metal, keeps jackets cooler!**

Now you can do a superior job of furnace insulation—and save precious steel in the bargain—by using Ultralite, the long, strong glass fiber insulation!

The new method, as practiced by leading furnace manufacturers, is simply this: Replace baffle plates (1) with blankets of Ultralite thermal and acoustical Heater Insulation (2), as shown in the photo above. By removing one step in your operations, you'll save time. You'll also find that Ultralite keeps jackets cooler and does a better job of deadening objectionable popping and crackling noises!



You can adhere Ultralite thermal and acoustical Heater Insulation to metal with adhesives alone; it is **not** necessary to use screws and washers. Ultralite's long, strong glass fibers are non-irritating, non-corrosive, fire-resistant, and as permanent as glass itself.

For free samples and catalog A.I.A. File No. 37-D-2, WRITE TODAY!

Please send me samples of ULTRALITE and catalog A.I.A. File No. 37-D-2. HP-1

NAME____

COMPANY____

ADDRESS____

CITY____________________STATE________________

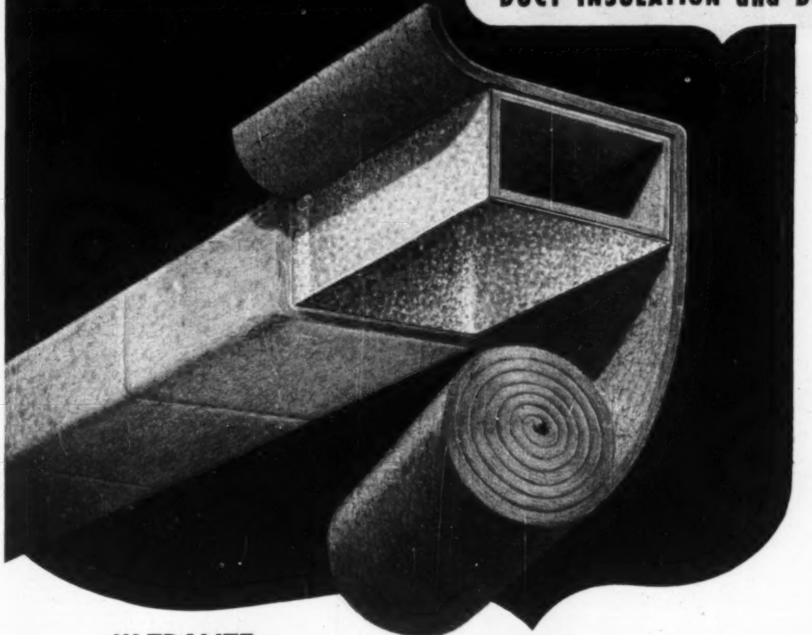
GUSTIN-BACON MANUFACTURING CO.
ULTRALITE INSULATION

GUSTIN-BACON MFG. CO.
1412 WEST 12TH ST., KANSAS CITY, MO.
New York Chicago Philadelphia San Francisco Los Angeles
Houston Tulsa Ft. Worth

It's "Duct Soup" to line and wrap ducts with

ULTRALITE

DUCT INSULATION and DUCT LINER



ULTRALITE, the long glass fiber insulation, goes on faster, easier, and cheaper than any insulation you've ever used! For Ultralite Duct Insulation and Duct Liner have every characteristic that makes application easy and quick. They're light, flexible, resilient; you can cut them with a knife; run them quickly around curves and corners; adhere them to metal with adhesives . . . screws and washers . . . wires. Try Ultralite—soon!

ULTRALITE DUCT INSULATION — THERMAL

A soft, resilient, flexible insulation of long, fine glass fibers with a low K-Factor. Available plain or with your choice of 4 vapor barrier facings, already adhered to the insulation. Wrap-around method of application cuts applied costs way down. Non-irritating, pleasant to handle. Fire-resistant, non-corrosive to metals.

ULTRALITE DUCT LINER — ACOUSTICAL

This is the duct liner that **won't burn**—a flexible, resilient, semi-rigid glass fiber insulation designed specifically as acoustical duct liner. Won't break, flake or chip. Runs quickly around curves and corners. Friction loss is low. Won't delaminate under air movement; won't flake off in air stream.

For free samples and catalog A.I.A. File No. 37-D-2, WRITE TODAY!

Please send me samples of ULTRALITE and catalog A.I.A. File No. 37-D-2.
HP-1

NAME______________________________

COMPANY______________________________

ADDRESS______________________________

CITY________________ STATE____________

GUSTIN-BACON
ULTRALITE
INSULATION
MANUFACTURING CO.

GUSTIN-BACON MFG. CO.
1412 WEST 12TH ST., KANSAS CITY, MO.
New York Chicago Philadelphia San Francisco Los Angeles
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Visit our booth #736 at the A. S. H. & V. E. Show, Philadelphia, January 22-26

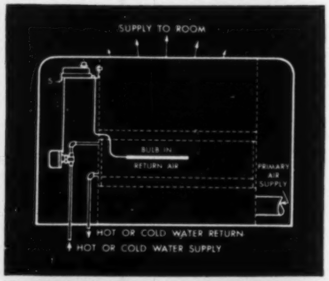
POWERS *Individual Room Control*

Insures MAXIMUM COMFORT

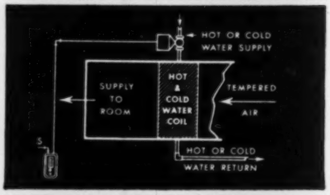
in HOTELS and APARTMENTS

in OFFICES and HOSPITALS

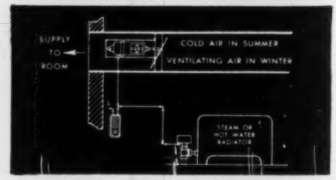
and other types of multi-room buildings

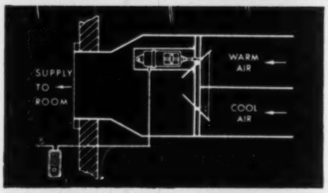

SUPPLY TO ROOM
S
BULB IN RETURN AIR
PRIMARY AIR SUPPLY
HOT OR COLD WATER RETURN
HOT OR COLD WATER SUPPLY

For systems using high pressure primary air in room unit

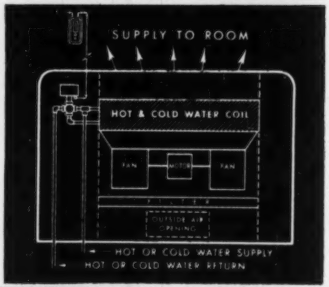

HOT OR COLD WATER SUPPLY
SUPPLY TO ROOM
HOT & COLD WATER COIL
TEMPERED AIR
S
HOT OR COLD WATER RETURN

For systems using individual coil in duct to each room


SUPPLY TO ROOM
COLD AIR IN SUMMER
VENTILATING AIR IN WINTER
S
STEAM OR HOT WATER RADIATOR


SUPPLY TO ROOM
WARM AIR
COOL AIR
S

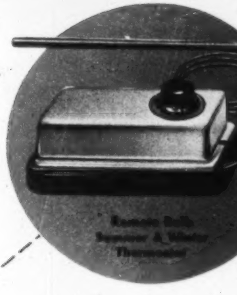
For systems using volume or mixing damper in duct to each room


SUPPLY TO ROOM
HOT & COLD WATER COIL
FAN
MOTOR
FAN
FILTER
OUTSIDE AIR OPENING
HOT OR COLD WATER SUPPLY
HOT OR COLD WATER RETURN

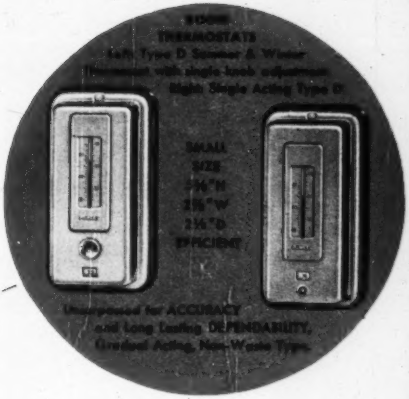
For systems using fan in room unit

For

Air Conditioning



Remote Bulb Summer & Winter Thermostat



ROOM THERMOSTATS
Left: Type D Summer & Winter Thermostat with single knob adjustment.
Right: Single Acting Type D

SMALL SIZE
5⅝"H
2⅝"W
2½"D
EFFICIENT

Unsurpassed for ACCURACY and Long Lasting DEPENDABILITY, Gradual Acting, Non-Waste Type.

Modern Standards of Comfort

. . . demand the many advantages of air conditioning systems with individual room control. To insure the best performance from this type of air conditioning regulate it with a Powers pneumatic system of temperature control.

With the experience gained from installations in many prominent buildings we may be able to help you select the type of control best suited for your requirements. Phone or write our nearest office, there is no obligation.

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Established 1891 • OFFICES IN OVER 50 CITIES • See Your Phone Book

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SAFETY FEATURE

POWERS
NO-PAK
PACKLESS
VALVES

Prevent Damage Caused by Water Leakage

PNEUMATIC DIAPHRAGM VALVES

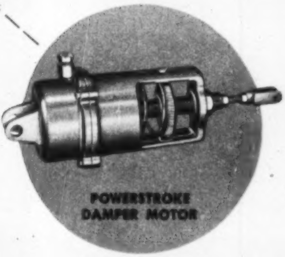
Sectional View of NO-PAK Construction

- Double Protection against loss of vacuum on steam systems or leakage on water systems. Requires no maintenance of packing gland.
- Gives BETTER CONTROL. Eliminates normal packing gland friction. LOW HYSTERESIS.

NO-PAK valves are available with union angle, straightway and 3-way bodies. Brass packless bellows (A) and Emergency Seal (B) give positive protection against leakage.

Powers Standard Valves are attractive in appearance and ruggedly built to give many years of trouble-free service. They are available with union angle, union straightway or 3-way bodies.

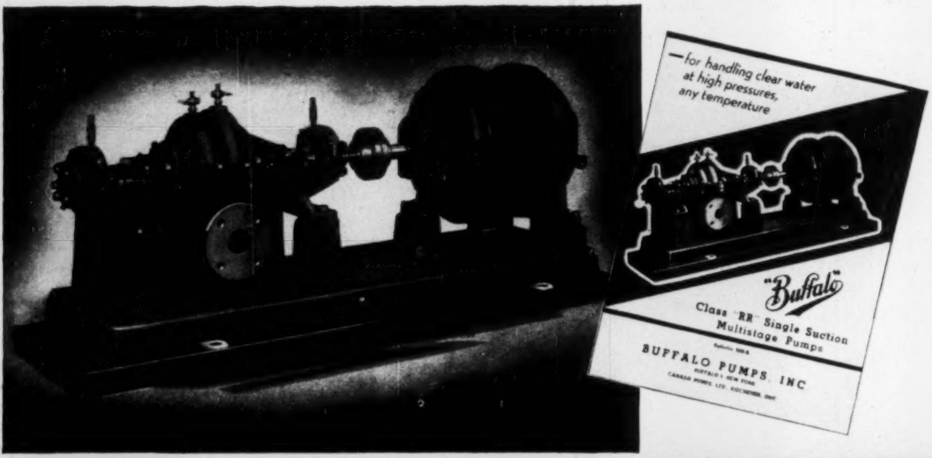
Above: Small, compact pneumatic valve is easy to install on small convectors and other heaters where space is limited. Available with union angle and straightway bodies and standard packing.



POWERSTROKE DAMPER MOTOR

Systems

(ACA



—for handling clear water at high pressures, any temperature

"Buffalo"

Class "RR" Single Suction Multistage Pumps

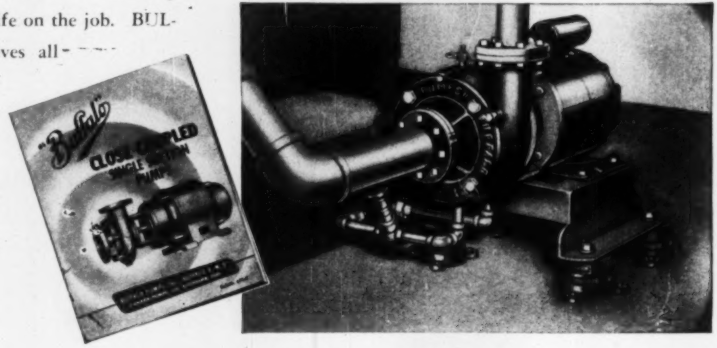
BUFFALO PUMPS, INC

Many CLEAR WATER Pumping Problems *Cleared Up* in these Bulletins!

IF your concern is with boiler feed or other pressures to approximately 500 lbs. clear water, you will find that "Buffalo" Type "RR" Pumps have the characteristics you want — including high efficiency and long life on the job. BULLETIN 980-B, above, gives all engineering data.

For cramped quarters, you'll find "Buffalo" Close-Coupled Pumps pack a lot of capacity to the cubic inch. Vertical or horizontal installation. BULLETIN 975-B, below, has the facts on these sturdy, efficient pumps.

WRITE FOR YOUR *Free* COPIES!



"Buffalo" PUMPS

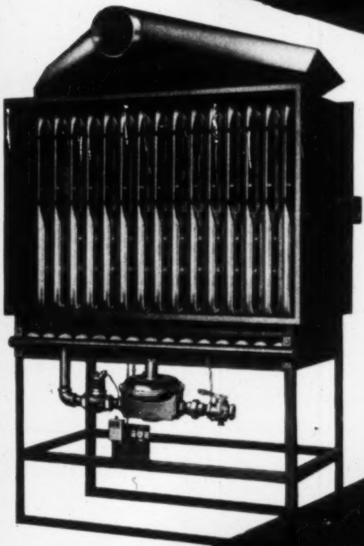
BUFFALO PUMPS INC.

171 MORTIMER ST. BUFFALO, NEW YORK

Canada Pumps, Ltd., Kitchener, Ont.

Branch Offices in all Principal Cities

A BETTER CENTRIFUGAL PUMP FOR EVERY LIQUID



MOD

See us at Philly...

WE have something new to show you!

We can't tell you about it here, but if you're interested in air moving equipment – you'll want to see it!

In addition, of course, we'll show some of our latest air conditioning and heating apparatus, the husky, heavy-duty equipment that has made friends for "Buffalo" for seventy-three years.

If you're at the 10th International Heating & Ventilating Exposition, we'll be looking for you at space 79.

Write for any of the bulletins shown at left if you do not have them – they contain ratings and engineering data on four outstanding values:

Bulletin 3158-B	Buffalo Air Conditioning Cabinets
Bulletin 3675	Buffalo "LL" Ventilating Fans
Bulletin 3533-D	Buffalo Axial Flow Fans
Bulletin 3704	Buffalo Highboy Heaters

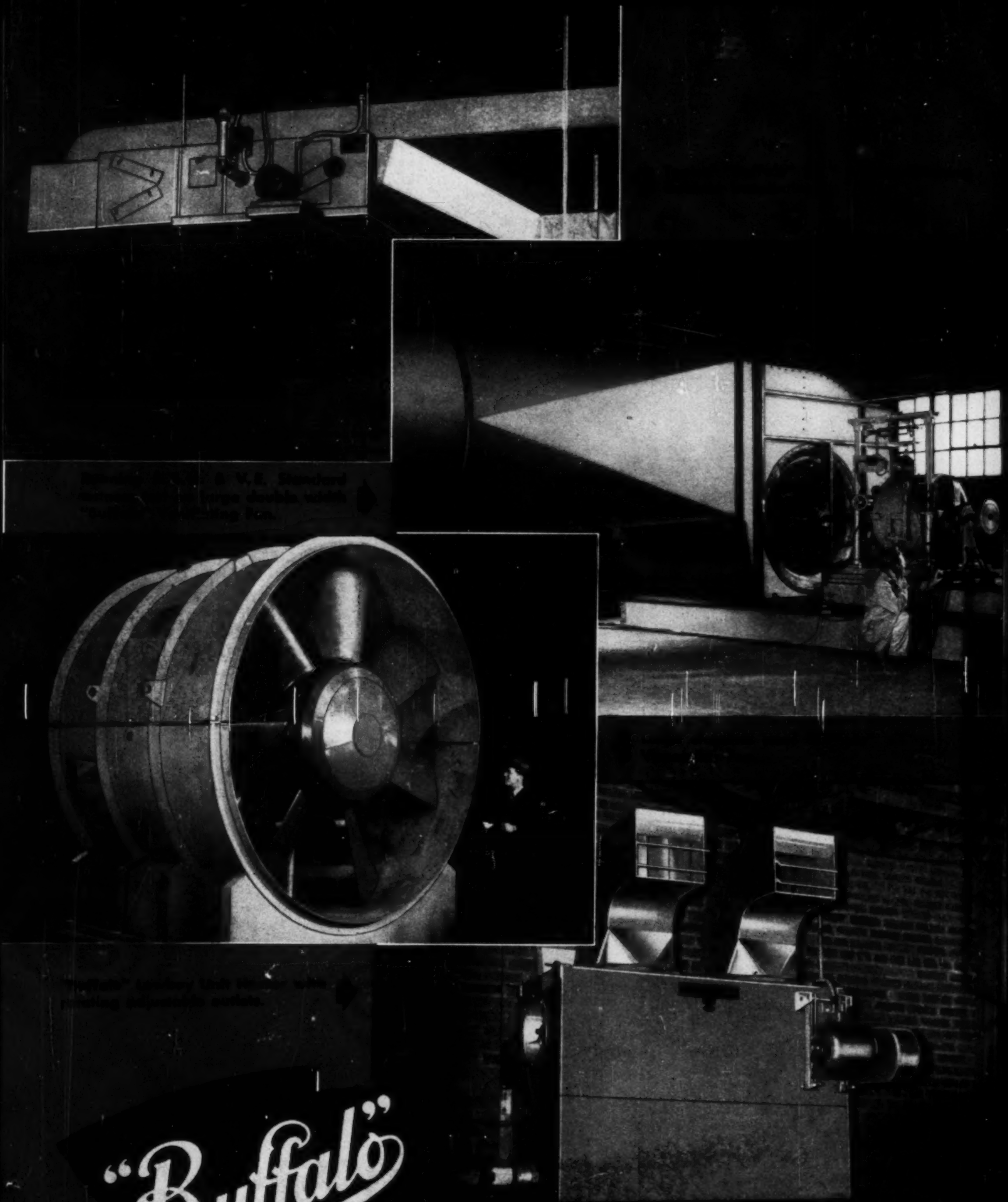
BUFFALO FORGE COMPANY

1 MORTIMER STREET BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Branch Offices in All Principal Cities

Buffalo
CENTRAL AIR CONDITIONING
Buffalo
TYPE "LL"
BUFFALO FORGE
CANADIAN BLOWER
Buffalo
TUB
BUFFAL
CANADIAN BLOW
Buffalo
HIGHBOY and LOWBOY
HEATING and VENTILATING UNITS
BUFFALO FORGE COMPANY

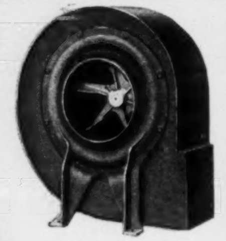


[illegible] & V.E. Standard [illegible] large double width "[illegible] [illegible]ing Fan.

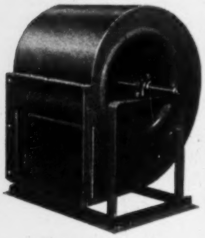
"Buffalo" [illegible] Unit Heater with [illegible] adjustable outlets.

"Buffalo"

AIR CONDITIONING
UNITS, FANS, HEATERS



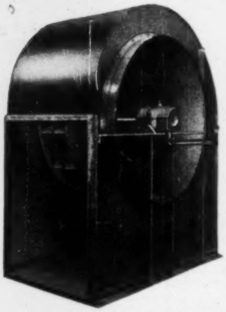
Industrial
Process Fans



Furnace and
Unit Conditioner Fans

Extra Heavy Construction . . .

Unicoil
Conditioning Units



Ventilating
and Conditioning Fans

Air Washers
and Purifiers

Choice of leading architects, engineers and contractors — for nearly 40 years.

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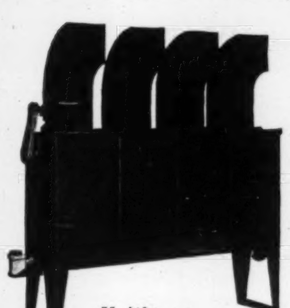
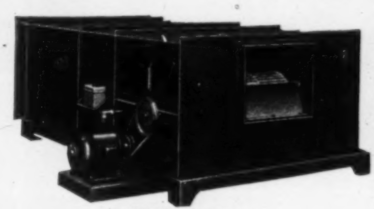
SEE OUR
CATALOG IN
SWEET'S

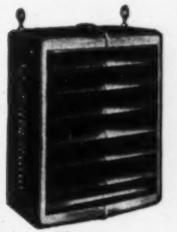
• • • • •



Unitherm
Unit Heaters
with Syncrotherm Control



Multitherm
Conditioning Units



Clarco
Unit Heaters

. . . for

Extra Years of Service

No weaklings in the Clarage air handling and conditioning line! . . . Every unit we built is *fully equal* to the job it handles. If faithful performance and operating economy are what you're after, we have the answer to your requirements. Your inquiry is invited. Try us!

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TENTH
INTERNATIONAL
HEATING & VENTILATING
EXPOSITION
Philadelphia
January 22-26

CLARAGE FAN COMPANY

KALAMAZOO, MICHIGAN . . . *Application Engineering Offices in All Principal Cities*

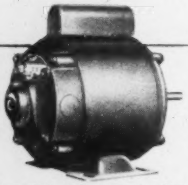
Century 1/8 TO 3/4 H. P. MOTORS

Choose From These Many Types to Fit Your Job

HEAVY-DUTY for Industrial and Appliance Use

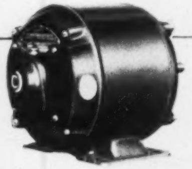
From Century's wide range of types and sizes, there's a proper motor for all popular applications. You can be confident that the right Century motor will assure a long life of satisfactory performance.

Shown here are examples of Century's line of FRACTIONAL HORSEPOWER motors—ruggedly built for smooth, quiet operation, with a remarkable freedom from vibration

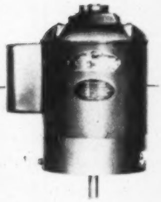


TYPE CSH — Capacitor Start Induction Single Phase Motor suitable where high starting torque and normal starting current is satisfactory.

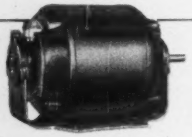
TYPE SP — Split Phase Induction, Rigid Base, Single Phase Motors suitable for light starting duty.



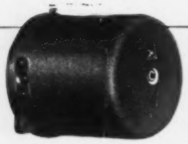
TYPE SC — Squirrel Cage Polyphase Motor built in fractional sizes for all torque requirements.



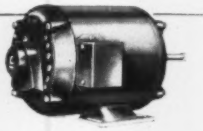
JET PUMP MOTOR—Capacitor Start Single Phase Motor available in sizes for practically every jet pump application.



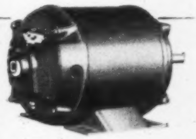
TYPE SP — Split Phase Induction, Cushion Base, for quiet operation.



OIL BURNER MOTOR especially designed for this service. Compact, rugged, smooth, quiet starting and running.

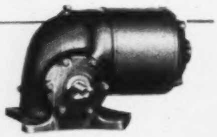


TYPE RS — Repulsion Start Induction Single Phase Brush Lifting Motor suitable for applications requiring high starting torque and low starting current.



TYPE DM — Direct Current built in sizes and ratings for applications where direct current is available or its use desirable.

UNIT HEATER MOTOR provides smooth, quiet performance throughout a long service life.



GEAR MOTOR, compact, rugged, ball bearing equipped, for your high torque, slow speed requirements.

The complete line of Century motors includes a wide range of types and kinds, from 1/8 to 400 horsepower. They are available in open rated, splash proof, totally enclosed fan cooled and explosion proof frames.

Specify Century motors for all your electric power requirements.

CENTURY ELECTRIC CO.
1806 Pine Street
St. Louis 3, Missouri

-682

OFFICES AND STOCK POINTS IN PRINCIPAL CITIES

Century 1 TO 400 H. P. MOTORS

Choose From These Many Types To Fit Your Job

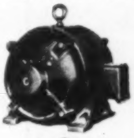
DEPENDABLE CONSTRUCTION . . . Plus PROPER SELECTION MINIMIZE SHUTDOWNS

It's easy to select the proper electric motor for your job from Century's complete line — from 1/6 to 400 horsepower. A wide range of types and kinds are available to satisfy all popular requirements. They are carefully designed, built and tested to assure maximum performance throughout their long life.

Here are examples of Century's line of INTEGRAL HORSEPOWER motors.

Polyphase

TYPE SC—Open Drip proof General Purpose Motor. Meets the needs of most installations where operating conditions are relatively clean and dry.

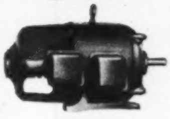


TYPE SC—Splash proof. Supplies protection where plants must be washed down. Keeps out all falling or splashing liquids—rain, snow, sleet, etc.

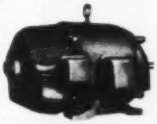
TYPE SC—Totally Enclosed Fan Cooled. Protects against dusts, mist, oil, fog. Inner frame protects vital parts of the motor, seals out harmful matter.

TYPE SC—Explosion proof. Protects life and property in atmospheres charged with explosive dusts or gases.

TYPE SR—Wound Rotor. Open Construction. Ideal for applications requiring low starting current with high starting torque, reversing or adjustable speed.



TYPE SR—Wound Rotor Splash proof. Same electrical characteristics as motor shown above. In addition, gives adequate protection against falling and splashing liquids.

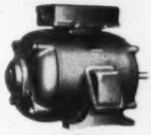


Single Phase

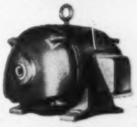
TYPE RS—Repulsion Start Induction, Open Construction, Single Phase Brush Lifting Motor. Combines high starting torque with low starting current.

TYPE RS—Splash proof. Same advantages as open construction, plus protection against splashing and falling liquids.

TYPE CSH—Capacitor Start Induction, Single Phase Motor. Suitable when high starting torque with normal starting current is satisfactory.



TYPE CSH—Splash proof. Same advantages as motor shown above, plus protection against falling and splashing liquids.



Direct Current

TYPE DN—Direct Current Motors. Suitable for use where direct current is available, or its use desirable.

TYPE DN—Direct Current, Splash proof.

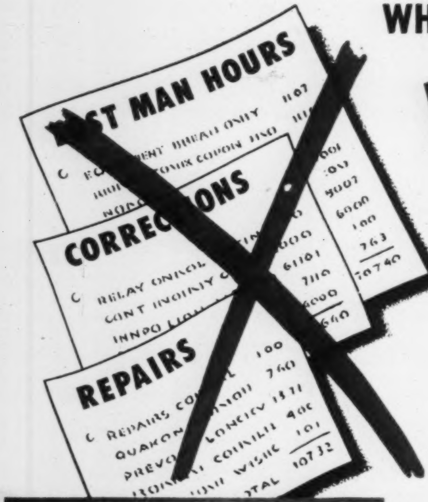
TYPE SY—Synchronous. Suitable for continuous operation at a uniform load for power factor correction.

In addition to a complete line of integral horsepower motors, Century offers fractional horsepower motors, gear motors, generators, AC and DC motor generator sets.

683

For a long life of satisfactory performance, specify Century motors for all your electric power requirements.

CENTURY ELECTRIC COMPANY, 1806 Pine Street, St. Louis 3, Missouri • Offices and Stock Points in Principal Cities



WHEN INSTALLING INSULATED PIPING

MAKESHIFT METHODS

ARE ***NOT*** CHEAP

Makeshift or cut-fit-and-try methods are time-consuming and costly when applied to the field installation of either underground or exposed insulated piping.

The use of Ric-wiL Prefabricated Insulated Piping reduces this time and cost figure, producing worthwhile savings in installation costs. All Ric-wiL units, whether 21-foot straight-run sections or accessories such as elbows, tees, anchors and loops, are completely prefabricated to exact pre-installation engineering plans to insure fastest possible installation.

The high thermal efficiency and operating performance found in Ric-wiL systems are accomplished by exacting manufacturing standards and the use of the finest known insulating and corrosion-resistant materials. Forty years of experience in the insulated piping field are reflected in the high performance records of Ric-wiL systems in operation.

Call the Ric-wiL office nearest you and our representative will be glad to discuss your specific problem at your convenience.

For full technical information on Ric-wiL Insulated Piping Systems, call or write the Ric-wiL office nearest you or Dept. 1-P in Cleveland, Ohio.

Ric-wiL 40th YEAR DEPENDABLE INSULATED PIPING SYSTEMS

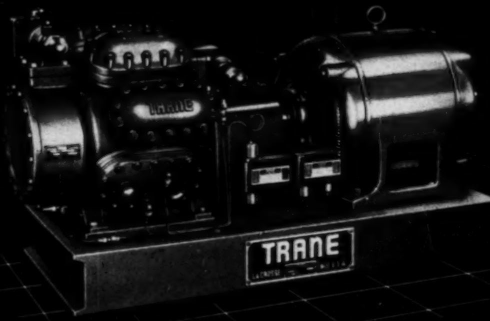
Ric-wiL

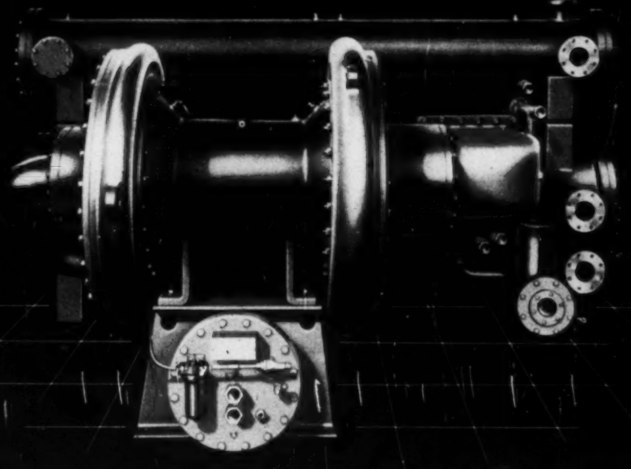
INSULATED PIPING SYSTEMS

OVERHEAD **THE RIC-WIL COMPANY • CLEVELAND, O.** UNDERGROUND

FOR FORTY YEARS THE GREATEST NAME IN INSULATED PIPING SYSTEMS

TRANE





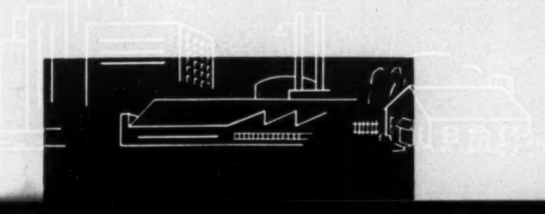
3 GREAT NEW TRANE AIR CONDITIONING PRODUCTS

For a quarter-century, The Trane Company has devoted its design ability and manufacturing skill to building an ever-increasing selection of component parts — from which could be assembled the very best engineered heating and air conditioning systems.

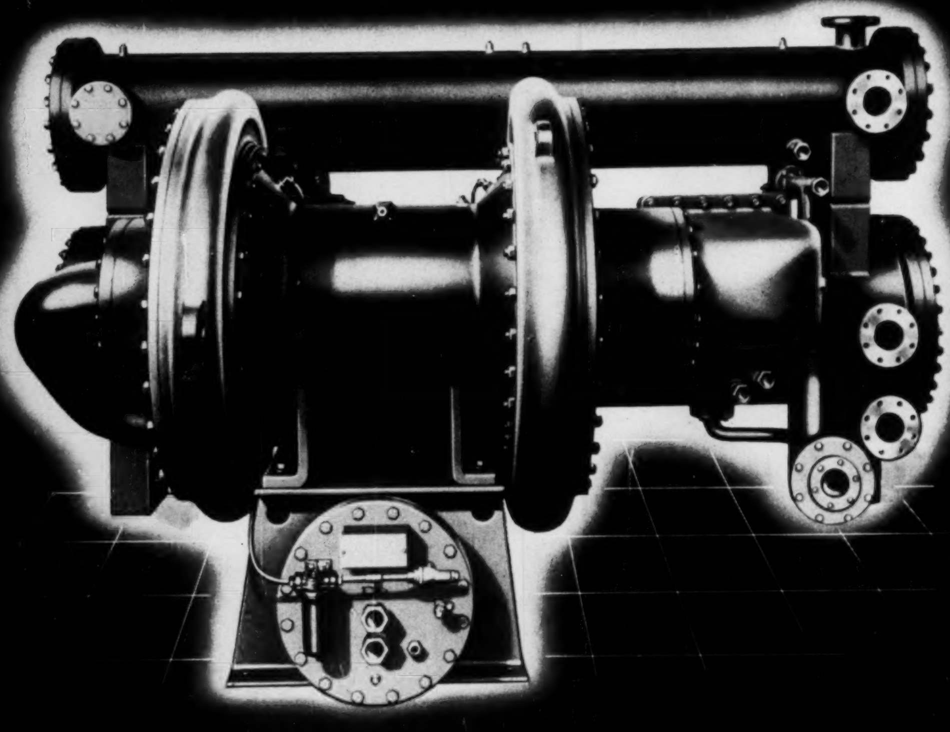
Now Trane announces three great new products — (1) A new *Centrifugal* Compressor that will revolutionize application of such equipment — (2) A new *Reciprocating* Compressor with exclusive Trane features to insure long life — (3) A new, neater, more compact Self-Contained Air Conditioner. Now more than ever you may turn to one completely reliable source to provide you with:

1. Undivided responsibility for performance of your entire system.
2. Essential parts designed, manufactured, and tested together for use together.
3. Selection from one set of catalogs, using uniform ratings.
4. Convenience: basic products are ordered together and shipped together.

Read the engineering facts about the two all-new Trane Compressors, and the new Trane Self-Contained Air Conditioner on the next few pages.



• *See these and other new products in the giant Trane show at the 10th International Air Conditioning Exposition in Philadelphia, January 22-26.*



THE NEW **TRANE** CENTRIFUGAL UNIT

New CENTRAVAC – Only Centrifugal in 45-150 Ton Range

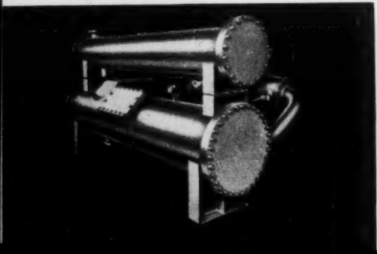
The new Trane Centravac is destined to make refrigeration history with its two revolutionary developments. First, it is the only Centrifugal available in the 45 to 150 ton range. Second, Trane engineers have created a Centrifugal in which power reduction is greater than capacity reduction over wide operating ranges. Now the Centrifugal Compressor can be used to furnish chilled water for installations as low as 45 tons. In addition to power economies, the capacity control in the Centravac insures economical and stable machine operation from 100% down to 20% — the conditions encountered in normal air conditioning application.

Centrifugal refrigeration is, for the first time, made available for the smaller installation and with the greatest possible economy — truly a great refrigeration development.

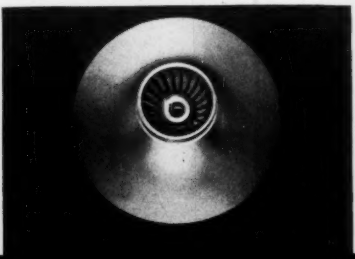
The impellers of the new Centravac are mounted directly on the shaft of a water-cooled motor. This motor is hermetically enclosed in the machine, hence seals and gear boxes, with all their problems of maintenance and service, are completely eliminated. Because of this construction, only two bearings are used in the entire system. Improved lubrication is obtained by a positive displacement oil pump.

Installation is easy. Because the Centravac is compact, light weight and operates quietly and without vibration, it can be mounted anywhere in the building. Refrigerant used in the Centravac is Freon-113, nontoxic, noninflammable. Available in five sizes from 45 to 190 tons.

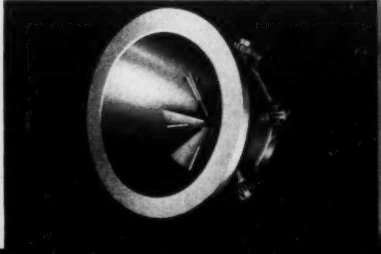
Rear view of new centrifugal compressor showing clean cut design.



Radial blade cast impeller with high efficiency.



Variable inlet vane assembly provides the ultimate in capacity control.



TRANE
TRANE
LA CROSSE
WIS U.S.A.

THE NEW **TRANE** RECIPROCATING UNIT

New, Smaller Compressor Has Bigger Capacity—Longer Life

Over-all size of the new Trane Reciprocating Compressor is no bigger than the motor required to run it. Greater capacity has been packed into this smaller direct driven unit.

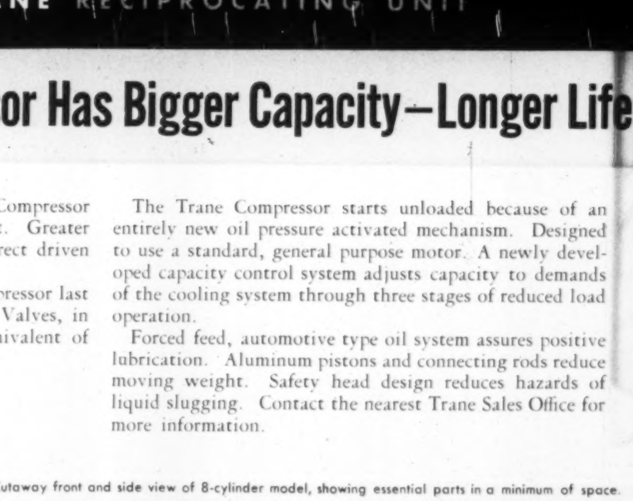
Exclusive Trane features make the new Compressor last longer. Valve life has been increased 900%. Valves, in test units, needed no attention after the equivalent of 7 seasons of continuous operation.

The Trane Compressor starts unloaded because of an entirely new oil pressure activated mechanism. Designed to use a standard, general purpose motor. A newly developed capacity control system adjusts capacity to demands of the cooling system through three stages of reduced load operation.

Forced feed, automotive type oil system assures positive lubrication. Aluminum pistons and connecting rods reduce moving weight. Safety head design reduces hazards of liquid slugging. Contact the nearest Trane Sales Office for more information.

COMPARE THESE TRANE RECIPROCATING COMPRESSOR FEATURES

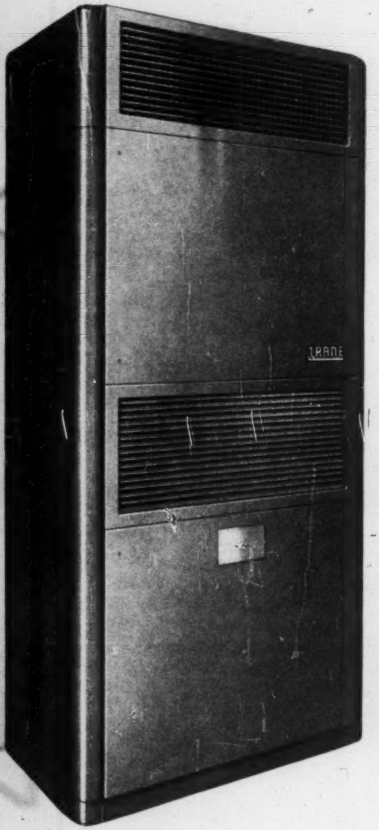
1. Outstanding capacity control over a wide range of operating conditions.
2. Entirely new design incorporating the latest developments in refrigeration practice.
3. Engineered especially for air conditioning.
4. Lower operating costs thanks to higher efficiency over wider ranges.
5. Forced feed positive type lubrication to protect vital moving parts.
6. Smoother operation due to careful balancing in design and manufacture.
7. Completely Trane engineered and Trane built.



Cutaway front and side view of 8-cylinder model, showing essential parts in a minimum of space.

New self-contained air conditioner sets new records in EFFICIENCY, ECONOMY, VALUE

Out of the ever-continuing Trane development program has emerged this highest-quality self-contained air conditioning unit. Here is a sturdier machine that occupies a minimum of floor space. Available in sizes down to 3 tons capacity. In every size there is extra quality at competitive prices.



Featured is a completely accessible hermetic compressor, the famous Trane Cooling Coil, thorough vibration elimination, panels insulated with fireproof fiber glass, two-directional outlet grills, quiet operation. Cam locked front panels are easily removed for easy servicing and maintenance. Optional discharge chamber with heating coil, if desired.

Shipped ready-to-run after 3 simple connections for water, electricity and drainage.

Designed for beauty as well as years of service, these new Trane units assure comfort and satisfaction on any job where a self-contained air conditioner is practical or desirable.

Your Trane Representative is ready with complete information about this new air conditioner. He can tell you also how the new Trane Compressors can be used with other Trane Cooling Equipment to create complete systems for better air conditioning.

TRANE

THE TRANE COMPANY, LA CROSSE, WISCONSIN

EASTERN MANUFACTURING DIVISION, SCRANTON, PENNSYLVANIA

Manufacturing Engineers of Heating, Ventilating, and Air Conditioning Equipment • Unit Heaters, Convectors, Heating and Cooling Coils, Fans, Compressors, Air Conditioners, Unit Ventilators, Special Heat Exchange Equipment, Steam and Hot Water Heating Specialties

. . . IN CANADA, TRANE COMPANY OF CANADA, LTD., TORONTO

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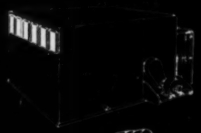
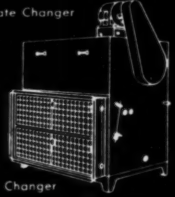
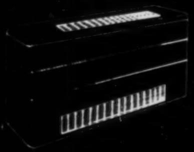
8 basic products by Trane, designed and built together for use together in complete air conditioning systems



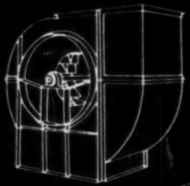
Multi-Zone Climate Changer



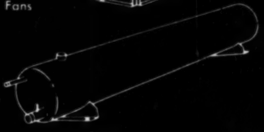
Vertical Climate Changer



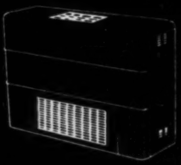
Custom-Air



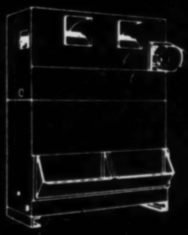
Centrifugal Fans



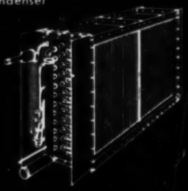
Direct Expansion Water Chiller



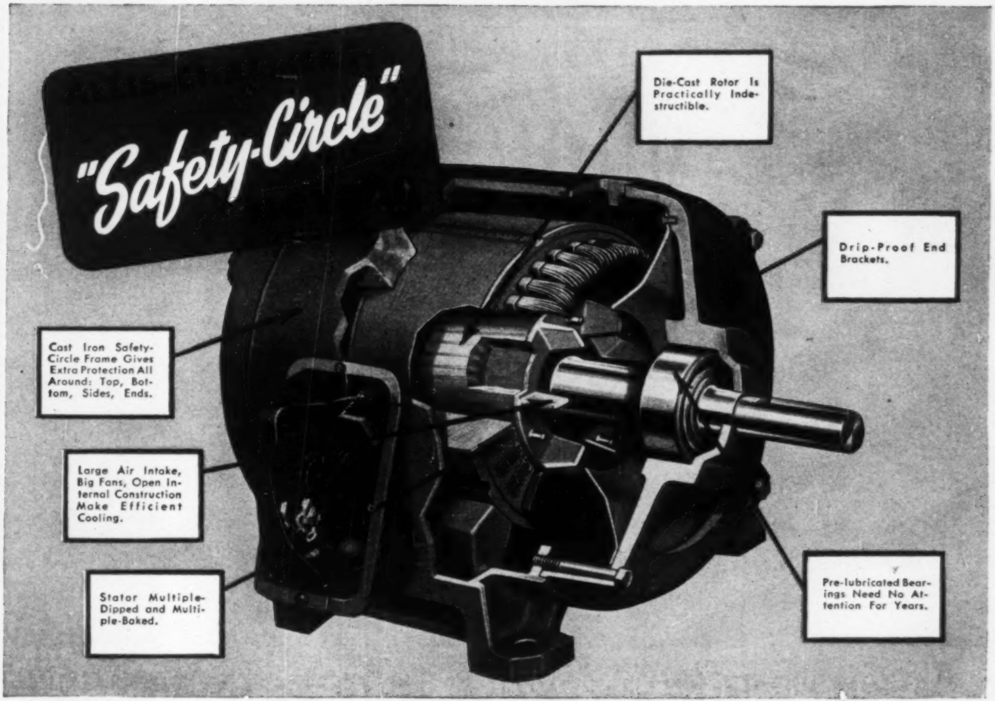
UniTrane



Evaporative Condenser



Cooling Coils


"Safety-Circle"
Die-Cast Rotor Is Practically Indestructible.
Drip-Proof End Brackets.
Cast Iron Safety-Circle Frame Gives Extra Protection All Around: Top, Bottom, Sides, Ends.
Large Air Intake, Big Fans, Open Internal Construction Make Efficient Cooling.
Stator Multiple-Dipped and Multiple-Baked.
Pre-lubricated Bearings Need No Attention For Years.

HOW SAFETY-CIRCLE
Means Motor Dependability

EXTRA PROTECTION means extra dependability. That's why Allis-Chalmers protects the working parts of the motor with the exclusive *SAFETY-CIRCLE*. Compare this motor with motors of less rigid construction. The *SAFETY-CIRCLE* motor will not distort in mounting or under strain. And you get the extra protection of drip-proof end brackets at no premium.

EXTRA PROTECTION INSIDE, TOO

Stator is multiple-dipped and multiple-baked in special insulating varnish. Rotor is die-cast aluminum. Stator is mounted in four longitudinal ribs which leaves plenty of air space between stator and frame. Large fans cast integrally with the rotor and ample air intakes keep temperatures well within rated limits. *Ball bearings are factory-lubricated and require no further attention for years.*

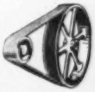
When you shop for motors, remember *SAFETY-CIRCLE* gives you *extra protection, extra dependability* and *lower operating costs.*

For details on *SAFETY-CIRCLE* advantages, see your A-C Authorized Dealer or Sales Office or write for Bulletin 51B6210B. Sizes 1 to 20 hp, 326 frames and smaller. *Safety-Circle, Texrope* and *Vari-Pitch* are Allis-Chalmers trademarks. A-3146

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

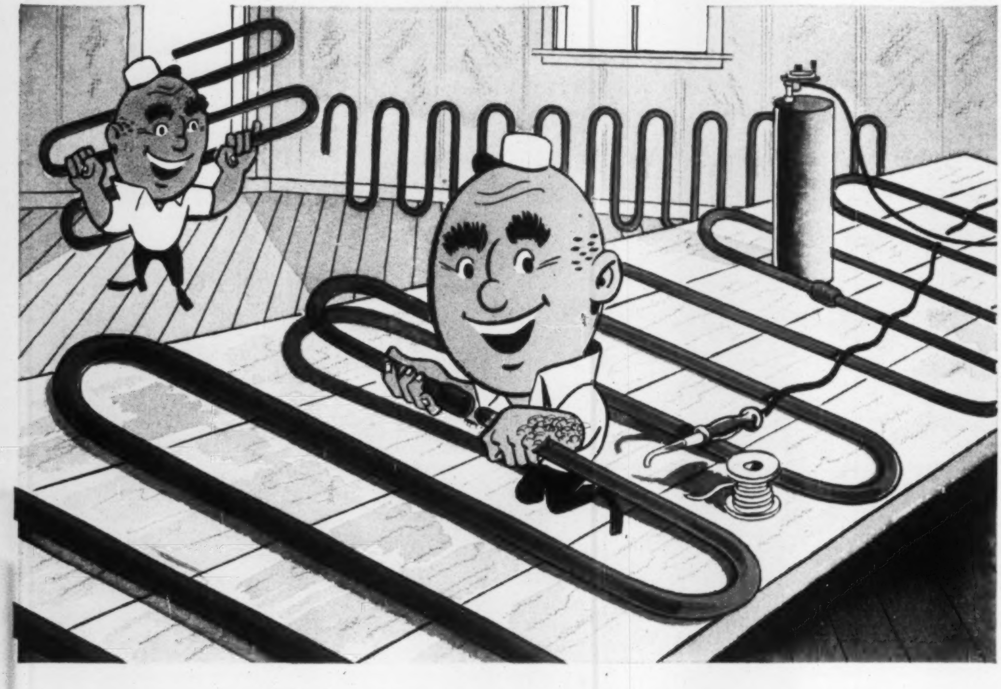


TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS, 1171A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS



Form radiant heating grids faster, too . . . with Bundyweld

NOTE that Bundyweld expanded end, above. It spells *even easier* radiant heating installation!

For twenty-foot lengths of Bundyweld Tubing can be sent to your building site with one end expanded (*if specified*). Then, one man quickly forms grid on simple fixture . . . slips unexpanded end into expanded end of the next grid, and silver brazes (or soft solders) grids into strong, permanent, leakproof union.

Two men can easily position the rigid, lightweight Bundyweld sections on ceilings or in floors. No hitches, delays. In jig time, your Bundyweld radiant heating system is all set, to the tune of a major savings in time and costs.

Bundyweld is double-walled from a single strip, copper-bonded through 360° of wall contact. It's stronger-walled, thinner-walled; bends more readily without collapsing structurally. Uniformity, even flow, maximum heat conductivity are yours!

Write today for the complete Bundyweld radiant heating story. ***Bundy Tubing Company, Detroit 14, Michigan.***

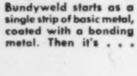
Bundyweld Tubing®

DOUBLE-WALLED FROM A SINGLE STRIP

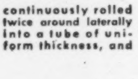
SIZES UP
TO 5/8" O.D.

NOTE the exclusive patented Bundyweld beveled edge, which affords a smoother joint, absence of bead and less chance for any leakage.

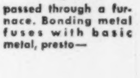
WHY BUNDYWELD IS BETTER TUBING



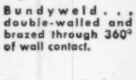
Bundyweld starts as a single strip of basic metal, coated with a bonding metal. Then it's . . .



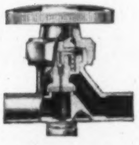
continuously rolled twice around laterally into a tube of uniform thickness, and



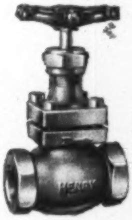
passed through a furnace. Bonding metal fuses with basic metal, presto—



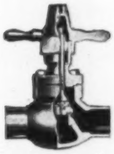
Bundyweld . . . double-walled and brazed through 360° of wall contact.



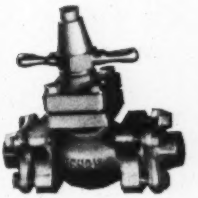
PACKLESS VALVE
With balanced-action



AMMONIA VALVE
Bolted Bonnet — screw or flanged connections. Also with screwed bonnet, sizes 1" and under



WING CAP VALVE
Non-ferrous



WING CAP VALVE
Semi-steel—with adapters

HENRY VALVE CO.
CONTROLLING FLOW
SINCE 1914

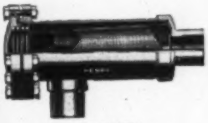
you pay –

no premium for..

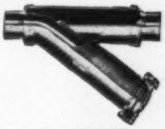
the extra advantages found in

Henry products

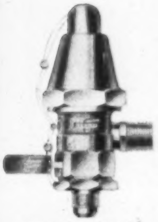
or for the extra satisfaction that follows their use



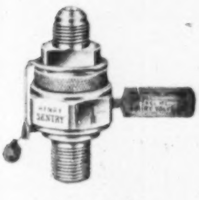
STRAINER
Angle type with patented distortion-proof flange



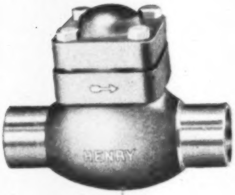
"Y" STRAINER
Welded steel with solder or F.P.T. connections



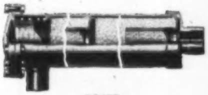
SUPER DIAPHRAGM RELIEF VALVE
With Built-in Replaceable Rupture Disc Cartridge in Outlet Port



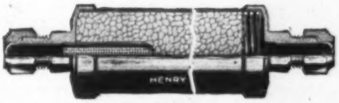
OVER-PRESSURE UNLOADER
With Replaceable Rupture Disc Cartridge



CHECK VALVE
Piston Type For Freon

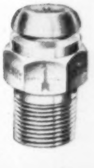


DRIER
Cartridge type with dispersion tube



DRIER
Brass shell with dispersion tube and compression spring

OVER-PRESSURE UNLOADERS, RUPTURE PLUG TYPE



A RUPTURE PLUG
Venting To Room Atmosphere "Throw-Away" Type

A RUPTURE PLUG
With Flare Outlet Connection For Venting To Outside Atmosphere. "Throw-Away" Type

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No. 100 Packless and packed valves, strainers, driers Ammonia valves, check valves, relief valves, three-way valves, scale traps, liquid gauge sets, flange unions, nut unions and accessories for air conditioning and refrigeration and industrial uses.

No. 70 Drop forged and cold rolled steel fittings.

Stocked and Sold by Leading Jobbers

VALVES • DRIERS • STRAINERS • CONTROL DEVICES and ACCESSORIES FOR REFRIGERATION and AIR CONDITIONING and INDUSTRIAL APPLICATIONS

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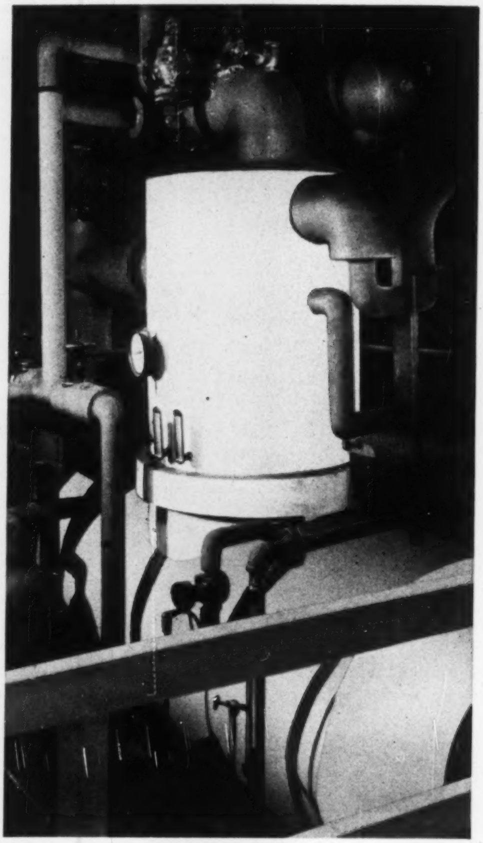
We have been asked:

Can insulation save my buying a new feed water heater?

Here's what a manufacturer wrote us recently: "Our factory uses steam for processing. Condensate return lines, which are now uninsulated, total 2106 feet in length. Our peak loads average 3 hours daily, and the feed water heater can furnish only 80% of recently increased load. Of course, this makes steam costly and inadequate for full production. Will it be necessary to buy a new feed water heater to increase the efficiency of our boiler, or can the application of insulation to the condensate lines do the job?"

Here's what we advised: While an additional feed water heater might solve your problem, it isn't necessary. Insulating your condensate lines will prevent loss of heat on the way back to the boiler and consequently will increase boiler efficiency. Too, insulating the lines will cost far less than installing a new feed water heater. The question then is—which kind of insulation will do the best job? Air-cell pipe covering would be adequate if peak loads were brief and occasional and return lines were short. However, the loads here are too heavy and the lines too long to make air-cell desirable.

Insulation of the return line with 85% Magnesia pipe covering is the best way to attain economical operation. The extra cost of this type of insulation will be repaid, under present conditions, within just a few months.



Armstrong engineers run across questions like this every day. Helping to solve these problems has given them valuable knowledge that could be put to work on your next insulation problem. You'll find these trained engineers in your near-by Armstrong office, and they will be glad to help you.

IF YOU HAVE ANY QUESTIONS involving industrial insulations for low- or high-temperature applications, we'll do our best to help you solve them. Just address a letter or post card to Armstrong Cork Company, 4401 Maple Avenue, Lancaster, Pennsylvania.

ARMSTRONG'S INDUSTRIAL INSULATIONS

MATERIALS AND INSTALLATION

FOR ALL TEMPERATURES FROM 300°F. BELOW ZERO TO 2800° F.

Like this record of low-cost maintenance?

make it yours
with dependable quality

CRANE VALVES

CRANE
CRANE

No. 960 Crane Brass Pressure Regulator for steam or air. Literature on request through your Crane Branch or Crane Wholesaler.

A CASE HISTORY FROM CRANE FILES

PROBLEM: To choose a pressure regulator that would assure a steady, unvarying steam supply to cooking kettle for an exacting brewing process.

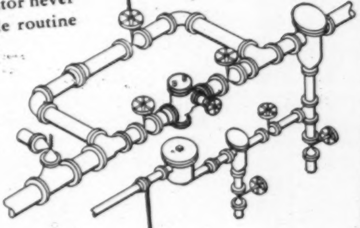
WORKING CONDITIONS: Regulator subject to continuous operation 24 hours per day. Main steam supply at 100 psi to be constantly reduced and maintained at 30 psi.

SOLUTION: Crane No. 960 Brass Pressure Regulator. (*Former model with integral non-renewable cylinder.*)

RESULT: For 16 years, throughout its lifetime, the Crane 960 Regulator never failed, never faltered, never required more than prescribed simple routine servicing.

Replaced with new Model 960 Crane Pressure Regulator. With all wearing parts renewable, it will virtually never wear out. Now in service 18 months; operating cost: zero.

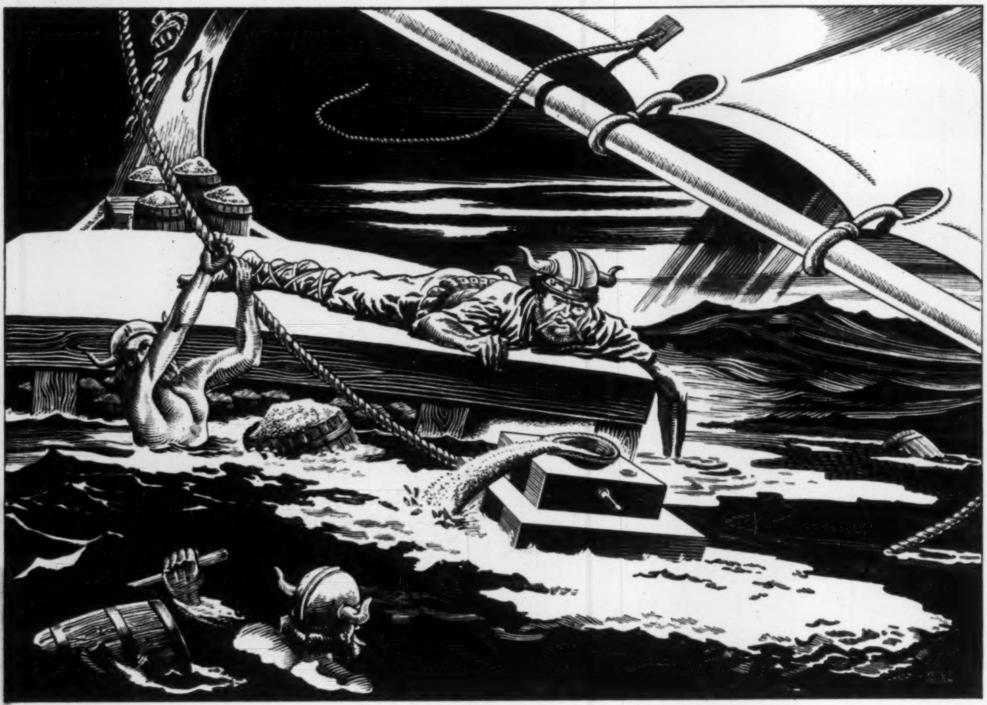
A typical example of the long life and low-cost maintenance that make Crane Quality the best value in all types of valves. That's why...
More CRANE VALVES are used than any other make



CRANE

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING



Why the sea is salty

In Norse mythology, a poor man got a magic mill from the elves. With it he could grind whatever he wanted--food, clothing, furniture, and best of all, gold. Of course, the poor peasant's lot changed from poverty to riches.

An envious brother borrowed the mill. He commanded it to "grind herrings and broth and grind them good and fast." But having taken the mill in such haste, he didn't know the magic words to shut it off. He was almost drowned in broth when the brother came to the rescue.

Finally, the magic mill was stolen by a salt dealer, who put it on his ship. Safely at sea, the skipper demanded, "Grind salt and grind it good and fast." Alas, he hadn't learned the control words either. The mill ground salt endlessly, filling all his kegs and his hold, covering the decks and at last sinking the ship. There at the bottom of the sea, so people say, the magic mill still grinds--and that's why the sea is salty.

From time immemorial, men have dreamed about magic mills and schemes to bring abundance and riches. Here in America, today, there are plans that are flooding us with superabundance of certain commodities. But what about the magic words to shut off the mill?

Isn't it time we see the truth in this ancient Norse myth, that "too much" is just as foolish as "too little?" We may well remember this first law of economics: In a *free* market, supply can adjust itself to demand--whether it be potatoes or steel--without sinking the ship. Here is a must job for all thinking Americans.

The Youngstown Sheet and Tube Company

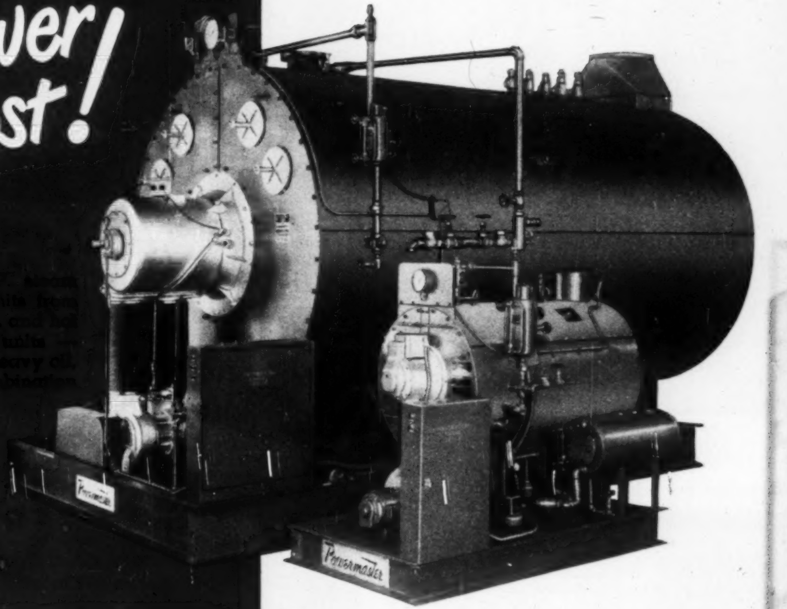
General Offices--Youngstown 1, Ohio
Export Offices--500 Fifth Avenue, New York
MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS

RAILROAD TRACK SPIKES - CONDUIT - HOT AND COLD FINISHED CARBON AND ALLOY BARS - PIPE AND TUBULAR PRODUCTS - WIRE - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - RODS - SHEETS - PLATES.

IN YOUR PLANT Powermaster

MEANS DEPENDABLE STEAM AND HOT WATER

at lower cost!



15 to 500 HP. steam generating units from 15 to 200 p.s.i. and hot water boiler units — for light oil, heavy oil, gas and combination gas/oil firing.

- Delivered completely wired and factory-tested
- Mounted on steel base -- no bricking required
- Automatic operation frees engineer for other duties
- Constructed to A. S. M. E. standards
- Approved by Underwriters' Laboratories
- Prompt service by factory-trained men

ORR & SEMBOWER, Inc.

manufacturers of

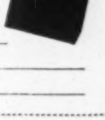
Powermaster

STEAM GENERATORS AND HOT WATER BOILER UNITS

Thousands of Powermaster users throughout the world are reducing operating costs as much as 40%. These fully automatic steam generators and hot water boiler units reduce fuel costs substantially—save man-hours daily—cut maintenance time to a minimum. All Powermaster components are carefully sized to coordinate most efficiently as a packaged unit, and you can be sure of safe, smokefree operation at all times. Write today for complete information on a Powermaster unit for your specific needs, or send coupon below for latest bulletin describing all units.

Orr & Sembower, Inc.
991 Morgantown Rd., Reading, Pa.

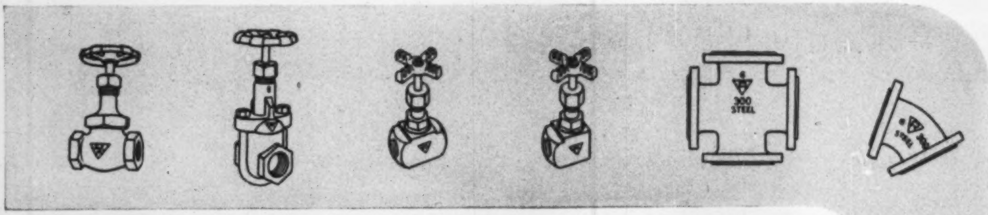
Please mail latest catalog showing Powermaster's cost-cutting advantages.

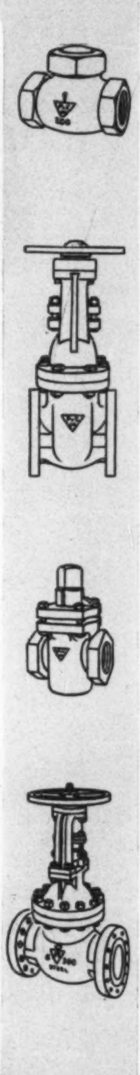


Name ______________________

Company ______________________

Address ______________________

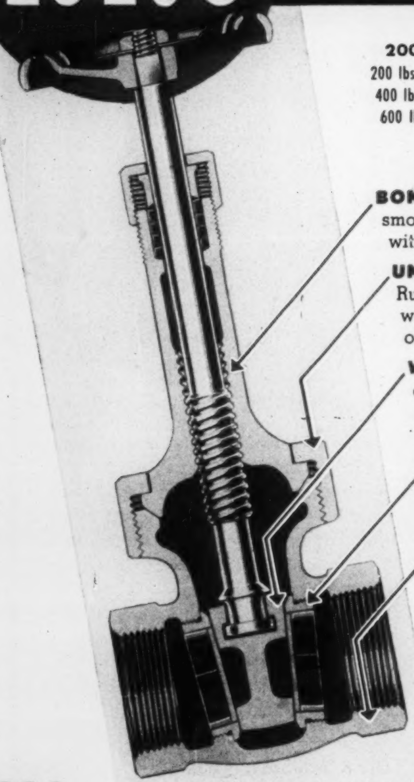




ASK YOUR R•P&C DISTRIBUTOR ABOUT

R•P&C

UNION BONNET
BRONZE GATE VALVES



200 LB. CLASS	300 LB. CLASS
200 lbs. steam at 500°F.	300 lbs. steam at 550°F.
400 lbs. OWG (non-shock)	600 lbs. OWG (non-shock)
600 lbs. Hydrostatic Test	800 lbs. Hydrostatic Test

Integral Bronze Seats
Nickel Bronze Seat Rings

BONNET P & C High Test Bronze with smoothly machined bevel for tight joint with body.

UNION RINGS P & C Valve Bronze. Rugged. Permits repeated disassembly without distortion of body or weakening of threads.

WEDGE Nickel alloy. Reversible. Milled grooves engage guide ribs in body, reducing seat wear. With valve full open, wedge clears line of flow.

SEAT RINGS Nickel alloy (renewable in sizes 1″ and larger) or bronze, integral with body.

BODY P & C High Test Bronze. Heavy end hexes. Heavy section and strong threads at union for long service.

● *Send*
FOR YOUR COPY
OF DH 191

ACCO

Reading, Pa., Atlanta, Baltimore, Boston, Chicago, Denver, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

R-P & C VALVE DIVISION
AMERICAN CHAIN & CABLE

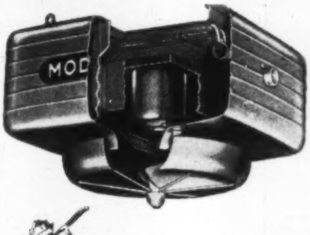
TRADE MARK

READING-
PRATT & CADY
VALVES

It pays to know your ground when selecting Unit Heaters

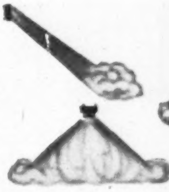
POINT TO STYLING

Compare Modines with other unit heaters, and you'll agree that Modines are out front in beauty—truly functional design. Styled by one of America's leading industrial designers, Modines offer you everything you want in clean, simple eye-appeal.



POINT TO CONSTRUCTION

With Modine Unit Heaters, you're set for the satisfaction of years of dependable service. Only corrosion-resistant copper and copper alloy are used for steam-carrying passages. Tubes and headers are cylindrical and brazed at the joints for maximum pressure-resisting strength. Differential stresses are absorbed by individual expansion bends. Casings are Parker-Bonderized for rust protection.

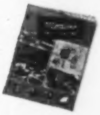


POINT TO PERFORMANCE

Choose any Modine—the *Horizontal*, the *Vertical*, or the *Power-Throw* — and you're assured of finest heating performance. You get the *right* combination of outlet air temperature, volume and velocity for uniform comfort . . . maximum economy. And versatile built-in diffusers . . . at no extra charge . . . give you unparalleled control of heat distribution.

You'll get the right one every time when you select Modine

Yes, *know* your ground and you'll surely select Modine! In factories, stores, hundreds of other locations the country over, Modine Unit Heaters are *first* for service. Get all the facts from your nearest Modine representative—listed in your phone book classified section. Or write direct. Modine Mfg. Co., 1509 Dekoven Avenue, Racine, Wisconsin.



Ask for Modine Unit Heater Bulletin 149A. Also available — bulletins covering special applications in commercial brooder houses, greenhouses, and milk houses.

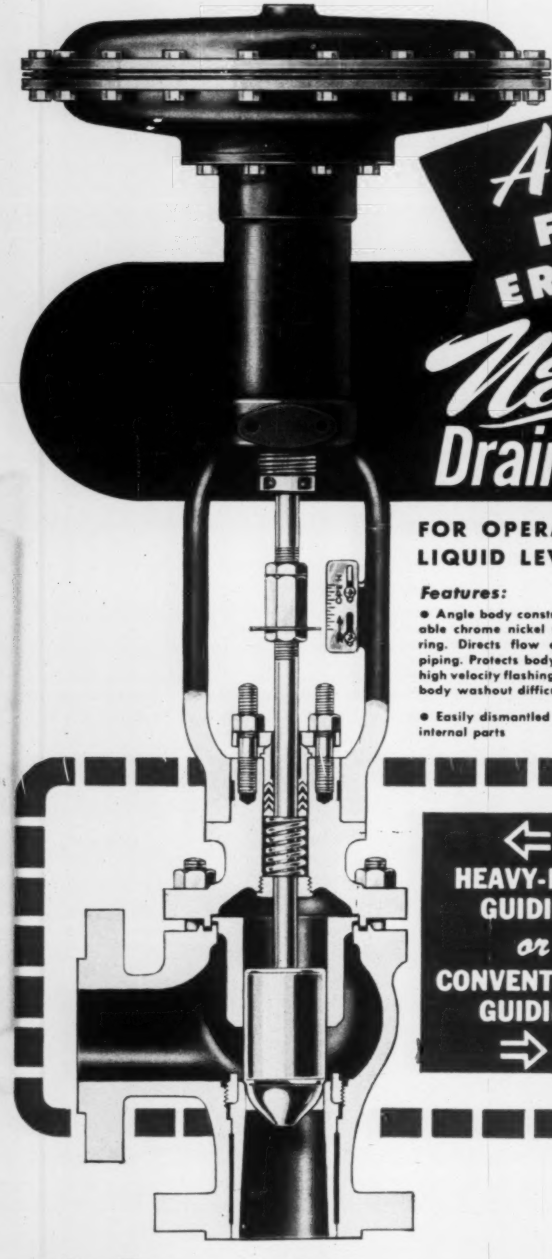
U-1084

Modine UNIT HEATERS

FOR FACTORIES • STORES • GREENHOUSES • COMMERCIAL BROODER HOUSES • MANY OTHER APPLICATIONS

A Natural for FLASHING OR EROSIVE SERVICE

New FISHER® Drainer Control Valve

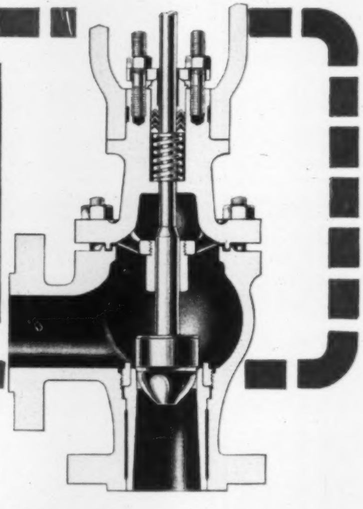


FOR OPERATION BY PRESSURE OR LIQUID LEVEL CONTROLLERS

Features:

- Angle body construction with renewable chrome nickel stainless steel seat ring. Directs flow directly into outlet piping. Protects body from contact with high velocity flashing fluids—preventing body washout difficulties.
- Easily dismantled for replacing worn internal parts
- Available with heavy duty or conventional positive alignment inner valve guiding.
- Iron or steel flanged angle body construction in sizes 1″, 2″, 3″, 4″ and 6″.
- Operated by suitable super-structure to overcome pressure unbalance conditions.
- Furnished with Fisher Teflon V-Ring Packing. Requires no lubrication.

⇐ **HEAVY-DUTY GUIDING** *or* **CONVENTIONAL GUIDING** ⇒



Fisher Governor Company

MARSHALLTOWN, IOWA

AEROFIN

Heat-Transfer Surface

Aerofin is sold only by manufacturers of nationally advertised fan system apparatus. List on request.

- **High Efficiency**
- **Long Service Life**
- **Low Maintenance Costs**

You are assured of high efficiency in heating or cooling — long service life — low maintenance and service costs, when you specify Aerofin extended-surface heat exchangers.

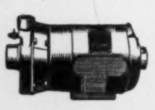
The reason is obvious: Aerofin makes heat exchangers *exclusively* — offers you the results of unequalled experience, unequalled production facilities, unequalled materials testing and design research — and the guidance of a complete, highly skilled engineering staff, at the plant and in the field.

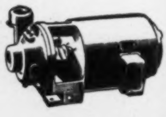
For the most practical solution to your heat-exchange problem, ASK THE AEROFIN MAN.

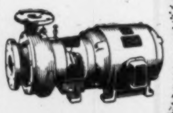
AEROFIN CORPORATION

410 South Geddes St.
SYRACUSE 1, N. Y.

NEW YORK • BOSTON • CHICAGO • CLEVELAND • DETROIT • PHILADELPHIA • DALLAS
SAN FRANCISCO • MONTREAL • TORONTO


SSR Fractional hp.


Electrifugal 1 to 10 hp.


SSU 10 to 125 hp.

ALLIS-CHALMERS PACKAGE PUMPS

Competent Installation Engineering Puts Extra-Value Into This Pump

When you choose an Allis-Chalmers pump for your air conditioning equipment or installation, the Allis-Chalmers representative goes over the complete installation with you to make sure that you get exactly the pump you need for easy installation and customer satisfaction.

Every Allis-Chalmers pump representative is a skilled application engineer who thoroughly understands your pumping problems. He has a complete line of pumps, both close-coupled and pedestal-mounted for every air conditioning application.

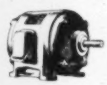
Call in the Allis-Chalmers representative while you are planning your equipment or installation. He may be able to save you time and money by suggesting easier and better ways to install pump or piping. He will be glad to help you in any way he can.

For complete information on Allis-Chalmers pump for air conditioning, ask for Bulletin 52B7529.

A-3221

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.


MOTORS — ½ to 25,000 hp and up. All types.

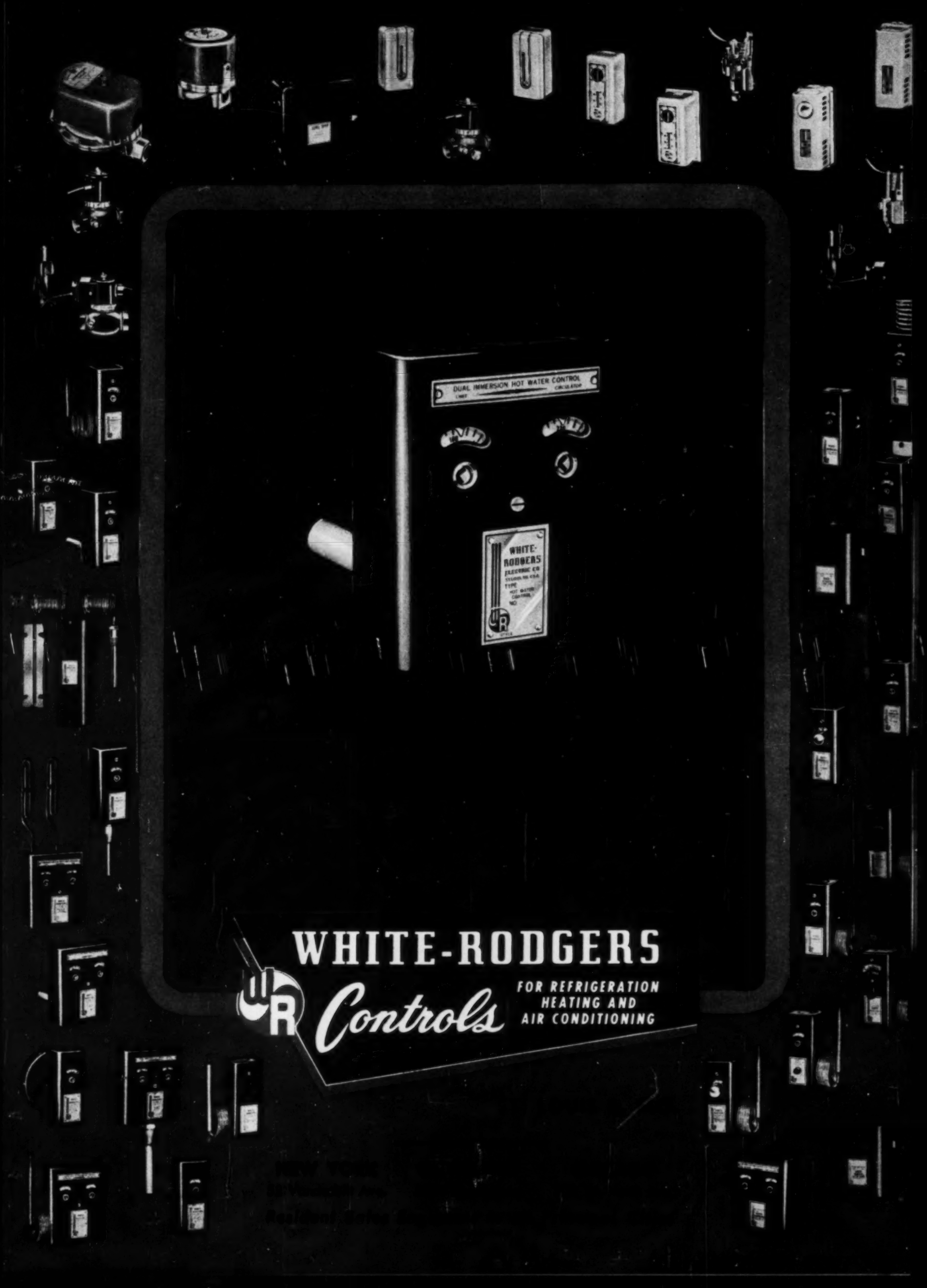
CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

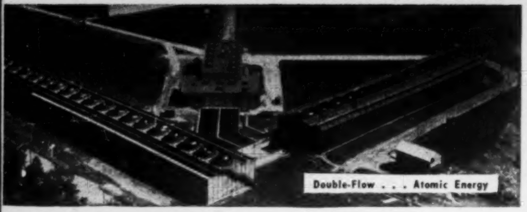
ALLIS-CHALMERS, 1171A SO. 70 ST.
MILWAUKEE, WIS.

Texrope, Vari-Pitch and *Electrifugal* are Allis-Chalmers trademarks.

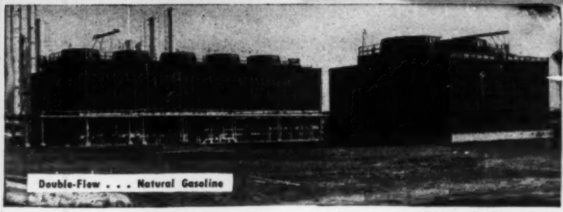
ALLIS-CHALMERS



DUAL IMMERSION HOT WATER CONTROL
LIMIT
CIRCULATOR
WHITE-RODGERS ELECTRIC CO
ST. LOUIS, U.S.A.
TYPE
HOT WATER CONTROL
NO
WHITE-RODGERS
WR
Controls
FOR REFRIGERATION
HEATING AND
AIR CONDITIONING
NEW YORK
30 Vanderbilt Ave.
Resident Sales [illegible]



Double-Flow . . . Atomic Energy



Double-Flow . . . Natural Gasoline

WHAT IS YOUR COOLING PROBLEM?

IS IT COST? Cooling towers or DriCoolers can have a low first cost with higher operating cost and vice versa. Or, you can get an economical combination of both. Marley application engineers have a complete line of units to select from and the "know-how" to help you make the best selection for your purpose.

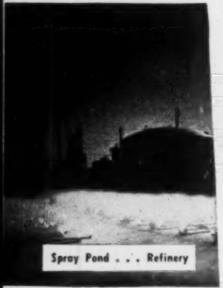
IS IT SPACE? Marley equipment may be installed indoors or outdoors. Units are available with large base area and low height to give light loading per square foot or with small base area and greater height to fit in small area.

IS IT TEMPERATURE? Usually, it is not economical to cool lower than a 5F approach to the wet bulb. However, in Marley cross-flow towers a quantity of water at wet bulb temperature may be obtained without added cost. For high level cooling, the DriCooler is applicable.

IS IT LOCATION? Extreme temperatures, cold or hot, dust, wet bulb, altitude, brackish water, wind, storm conditions, or lack of proper water supply are problems that must be considered. Marley has a unit to fit any geographical condition.

IS IT APPEARANCE? Marley has a wide range of designs that will blend with any building architecture. Or even become a part of the building itself. Marley engineers can help your architect give you a good looking as well as efficient installation.

These are only a few of the problems you may face in the selection of a cooling tower or DriCooler. No matter what the problem, Marley Application Engineers have the answer to help you invest your dollars wisely and profitably.

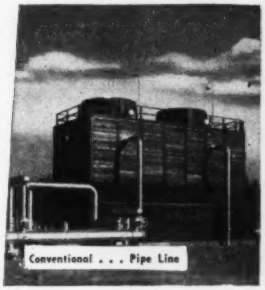


Spray Pond . . . Refinery

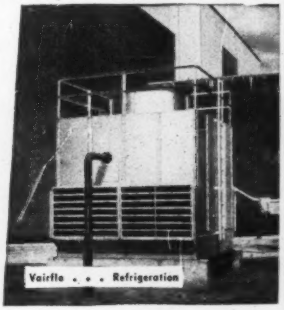
DriCooler . . . Diesel Cooling

Double-Flow . . . Power

Natural Draft . . . Air Conditioning



Conventional . . . Pipe Line



Vairflo . . . Refrigeration

DriCooler . . . Gas Cooling

Aquatower . . . Air Conditioning

MARLEY

HP-1

Write, Wire or Phone The Marley Company, Inc., Kansas City 15, Kansas.

Name ______________________ Title ______________

Company ______________________________________

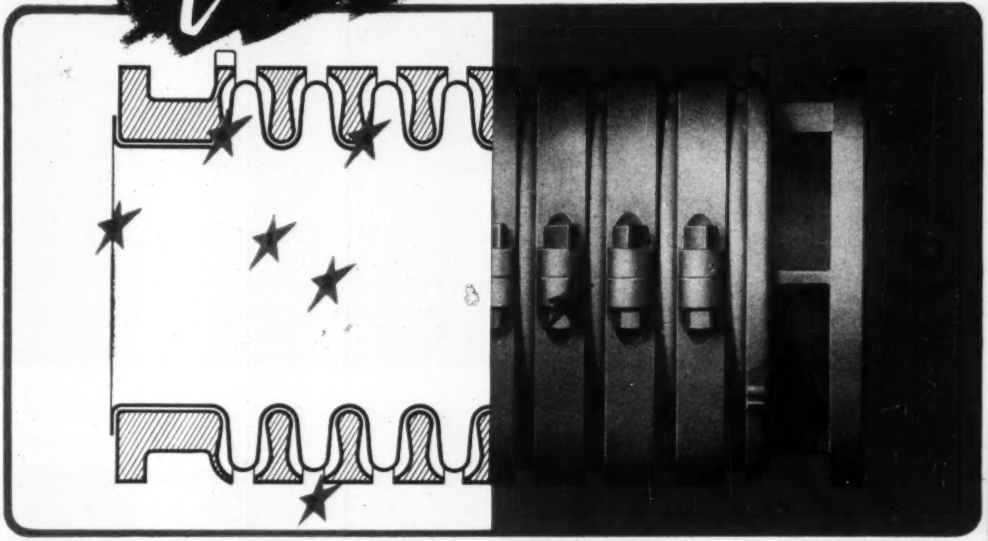
Address ______________________________________

City ________________ Zone ______ State __________

☐ Please send "What's Your Cooling Tower IQ"

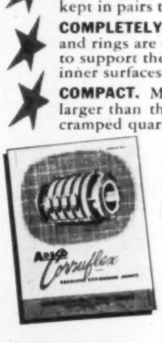
☐ Our Cooling Problem is ______________________

ADSCO *Corruflex* is better because...



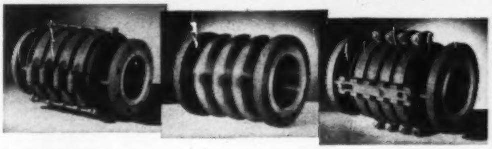
no other packless expansion joint combines ALL these features!

- **NO MAINTENANCE.** Since the corrugated element, made from a single tube of copper or stainless steel, is a flexing member designed to absorb expansion or contraction, neither stuffing box nor packing is necessary.
- **LONG LIFE.** The element is formed hydraulically to ensure uniform wall thickness. Annealing during and after forming relieves all internal strains. Flexing stresses are, therefore, evenly distributed and are not concentrated at welds or diaphragms.
- **UNIFORM RAISED FACE.** Element is hydraulically lapped over the end flange to form smooth, even face for joining to mating pipe flange.
- **EQUALLY DISTRIBUTED EXPANSION.** Equalizing rings of cast iron or steel control individual corrugation expansion and reinforce element walls.
- **STURDY CONSTRUCTION.** Heavy lugs and rings are cast in a single piece, accurately machined into halves and kept in pairs to ensure a tight joint.
- **COMPLETELY SUPPORTED ELEMENT.** Both end flanges and rings are contour shaped and scientifically designed to support the element throughout its entire length. All inner surfaces are carefully hand-finished.
- **COMPACT.** Maximum outside diameter is only slightly larger than that of the flanges. Ideal for installation in cramped quarters.



Send for Bulletin No. H-35-51

New 16-page bulletin explains design and construction and completely describes the line, with sizes, temperature and pressure ratings, dimensions and weights. Simplified selection charts make it easy to determine proper joint for most applications. Recommended installation practice is summarized.



Specify *Corruflex* Expansion Joints

Corruflex Joints are available in sizes from 3" to 24", single or double units, single or multiple corrugations, with or without self-equalizing rings, and with flanged or welding ends. They are supplied in copper, stainless steel or other alloys and with internal sleeves if required.

Corruflex Joints have traverses ranging from fractions of an inch to 15" and operate under pressures from vacuum to 300 psi and temperatures from sub-zero to 1600 F.

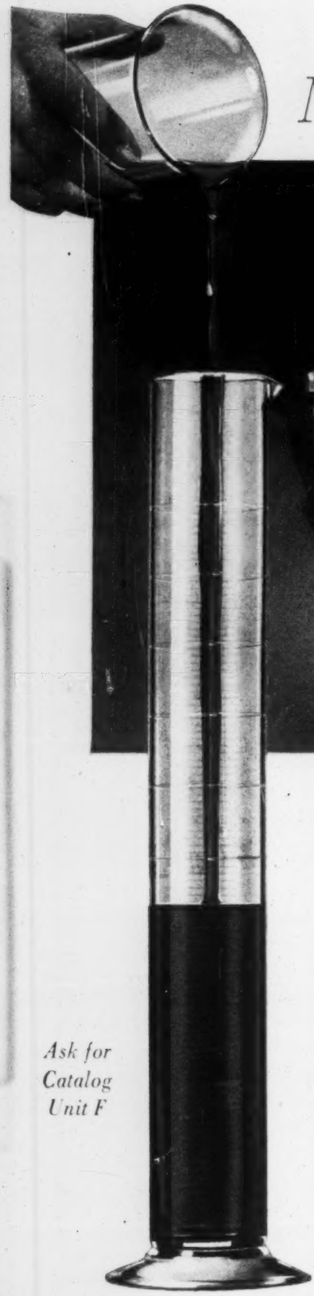
Remember, ADSCO offers the most complete line of expansion joints — both packed and packless — available from any manufacturer. For an impartial recommendation, consult the company that makes all types.

Expansion Joints
Steam Traps · Meters
Anchors · Guides

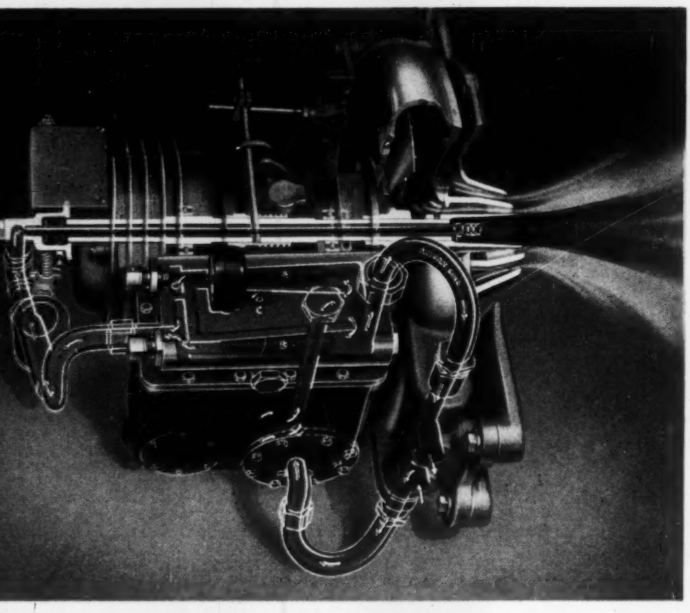
ADSCO
Since 1877

Heat Exchangers
Strainers · Separators
Casing · Supports

AMERICAN DISTRICT STEAM COMPANY, INC. · North Tonawanda, N. Y.



MEASURED FLOW *of fuel oil . . .*



. . . simply – WITH THE RAY VISCOSITY CONTROL SYSTEM*

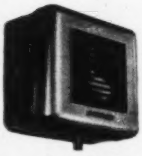
REGARDLESS OF TEMPERATURES . . . regardless of viscosity, the Ray Viscosity Control System meters oil to the burner at any desired predetermined rate. Fuel oil is fed uniformly to a double valve through a dual pump and reservoir. Pump discharge divides between the two valves exactly as required, passing only the desired amount into the fuel tube. There are no moving parts, no cost of operation in the Ray Viscosity Control System. Dual pump construction keeps flame steady by floating air bubbles out of the system. For fluctuating demands, an auxiliary valve is linked to the automatic variable fire control. When load demands go down, the valve *opens* to reduce flow. There is no simpler—or more efficient—method of viscosity compensation for oil burning equipment. A Ray product, the Viscosity Valve is for use only with Ray Oil Burners.

Ask for
Catalog
Unit F

**Patented*

SINCE 1872 **RAY OIL BURNER CO.**
401-499 BERNAL AVE., SAN FRANCISCO 12, CALIFORNIA
Atlantic Seaboard Division • 629 Grove Street, Jersey City, N. J.

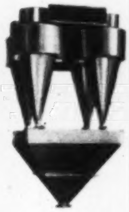
American Blower—a time-honored name in air handling

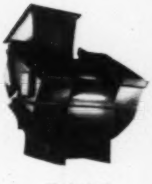

Venturafin Unit Heaters

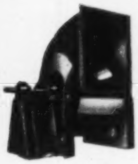
Type TM Gýrol Fluid Drives

Utility Sets

Ventura Ventilating Fans


Dust Collectors


Mechanical Draft Fans


Industrial Fans

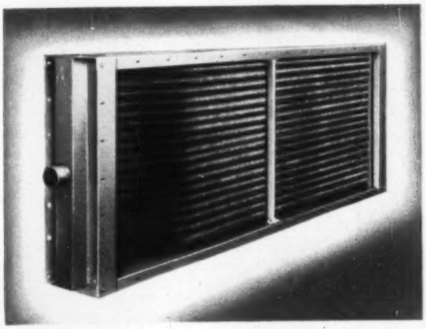
Heating and Cooling Coils

Air Conditioning Equipment

If you look before you buy, we're certain you'll buy American Blower Air Handling Equipment. There's a vast difference in quality, design, operating costs and efficiency between American Blower and ordinary equipment. In test after test by buyers, comparison proves the superiority of American Blower products.

In Philadelphia, as in other cities, American Blower Air Handling Products have been serving commerce, industry and public utilities for over half a century. If you attend the Heating and Ventilating Exposition January 22-26, 1951, you are extended a cordial invitation to visit our exhibit in Booth A.

Product of the month


Type S Steam Coil for normal blast heating. Tested and guaranteed for operation with steam pressures to 200 lbs. gauge and steam temperatures to 450°F. Write for Bulletin B-1218.

The heat's on!

The heat is *really* on. Current demands for heating from business and industry are greater now than ever before.

That's all the more reason for early action on your part if you want American Blower Heating Coils.

Whether you need coils for blast heating, zone reheating, or whether you want return bend coils or coils for modulated steam control—you'll find the size and type that best fit your needs in the American Blower line.

All tubing in American Blower coils is helically wound with copper or aluminum fins in three standard spacings. Coil casings are built of heavy galvanized steel; headers are of die-formed steel.

For further data contact the nearest American Blower Branch Office.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American Radiator & Standard Sanitary corporation

YOUR BEST BUY AMERICAN BLOWER AIR HANDLING EQUIPMENT

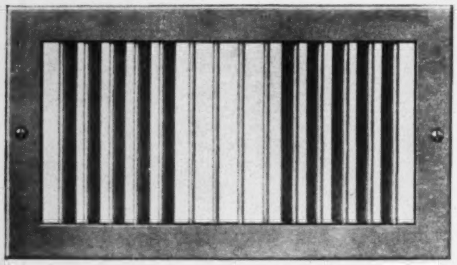
Serving home and industry

AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

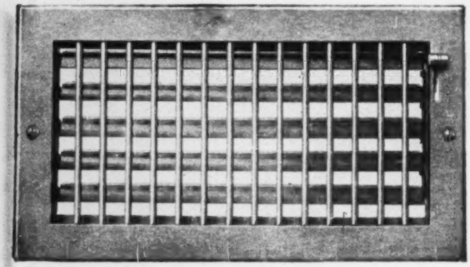
AUER *"Streamliners"*

Rank with the very finest in Registers and Grilles for

HIGH VELOCITY OUTLETS



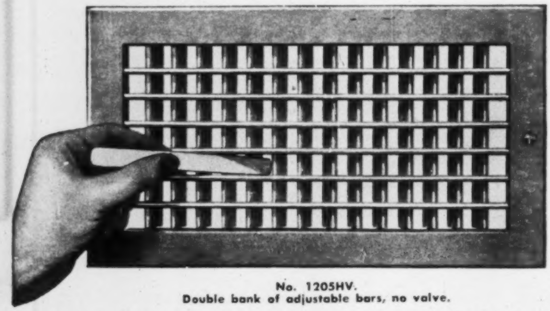
No. 1005V.
Single bank of adjustable bars, no valve.



No. 1005V-HML.
Single bank of adjustable bars, with multi-louvre valve.

In fact Streamliners, giving multiple deflection for high velocity systems of air conditioning, ventilating, or cooling, are in some respects in a class by themselves. For use as grilles they are made with single or double banks of adjustable bars. Registers are also made single or double face, with multi-louvre volume control. Note these special features:

- The hollow moulded bars, smooth in contour, are pivoted in the frame on unique split sleeves, or expansion inserts, effective for the life of the register. These furnish just enough tension to hold bars firmly where set, yet allow sufficient play to adjust accurately with simple tool.
- Each bar is pivoted in its exact center, and shaped somewhat similar to an airplane wing, so that for either return or supply, each bar can be completely turned around. For outlets, some users turn the thin edge to the front, and the broader edge toward the flow of air, thus using a basic theory of aerodynamics, and reducing resistance and turbulence to a minimum.
- Blades of multi-louvre volume control are pivoted on tension rivets to guard against vibration or noise, another important feature. These registers are absolutely quiet even at high velocities.
- There is nothing, so far as we know, to wear out, pull loose, or give way in service, in a Streamliner.



No. 1205HV.
Double bank of adjustable bars, no valve.

8 MODELS. The Series includes models with single bank of adjustable bars (vertical or horizontal), also with double bank of adjustable bars (vertical in front and horizontal in back, or the reverse), also all above four types with the addition of horizontal multi-louvre valves in the rear, controlled by lever on face of register.

Ask for Bulletin S-50. For forced air or gravity registers, we will send you complete Auer Register Book—for perforated grilles, Catalog "G".

THE AUER REGISTER CO, 6600 CLEMENT AVENUE, CLEVELAND 5, OHIO
CANADIAN DISTRIBUTOR, MARCHAND FURNACE, LTD., TILBURY, ONT.

Auer REGISTERS

& GRILLES *for* AIR CONDITIONING & GRAVITY

Setting new records
for low-cost ventilation
Everywhere!

JOY AXIVANE* FANS

WITH JOY AXIVANE Fans, you profit by the greater efficiency, quieter and smoother operation, and lower power consumption of their vaneaxial design. You save on installation, too. These light, compact, in-line fans mount directly in the air duct—saving space and time, making foundations, guards, etc. unnecessary. What's more, the important adjustable-blade feature of JOY Fans gives you extra flexibility—permits easy adjustment on the job to suit new conditions or compensate for faulty duct work. ● Let us show you how to get *best* ventilating results!

Write for Bulletin, or

Consult a Joy Engineer

W&D 12356

* *Reg. U.S. Pat. Off.*

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

ONLY THE SPORLAN CATCH-ALL FILTER-DRIER

offers you both

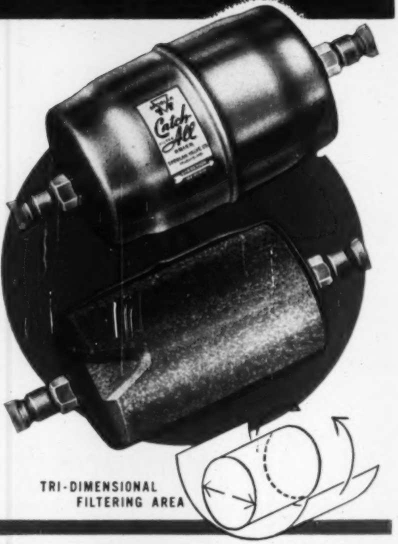
GREATEST FILTERING AREA
HIGHEST DEGREE OF ACTIVATION

Size for size, the Sporlan Catch-All with its scientifically molded porous cylinder offers the greatest filtering area because its end surface is augmented by its complete cylindrical surface into a tri-dimensional filtering area, filtering out any foreign matter as minute as 9 microns with negligible pressure drop!

Sporlan Catch-Alls are activated to the highest degree of dryness after they are completely assembled by subjecting them to a temperature of over 500° F. for a minimum of four hours! The Sporlan Catch-Alls are then sealed with moisture proof seals to prevent any loss of activation before installation.

When you want perfectly clean,
perfectly dry refrigeration systems . . . install
SPORLAN ***Catch-Alls***
the perfect filter-driers and GET PEAK PERFORMANCE ON ALL INSTALLATIONS

Catch-Alls are available in all sizes at
all Sporlan wholesalers



TRI-DIMENSIONAL FILTERING AREA

AND HERE ARE 5 ADDITIONAL EXCLUSIVE CATCH-ALL FEATURES

1. They cannot powder!
2. They cannot pack!
3. The refrigerant cannot channel around the desiccant!
4. The unique, porous Catch-All cylinders are molded of minute particles of a highly efficient desiccant, the efficiency of which is greater than that of the same desiccant in granular form.
5. They dry down to a low end point . . . a point so low that any remaining moisture is absolutely harmless!

SPORLAN
VALVE COMPANY

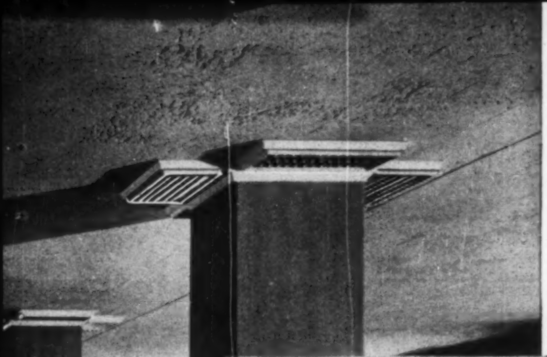
7525 SUSSEX AVENUE • • • ST. LOUIS 17, MISSOURI

AGITAIR®

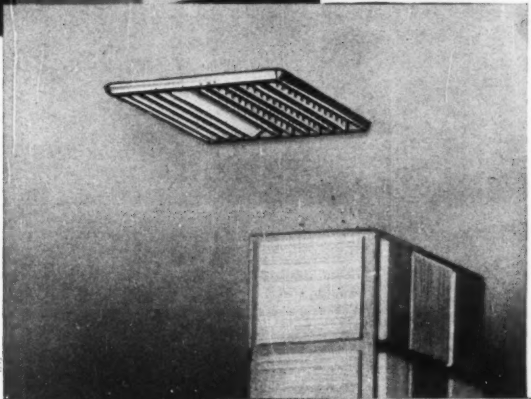
the Only Air Diffuser *Tailor-Made* for Each Application

Only Agitair Type R diffusers have patented built-in diffusing vanes. Only Agitair Type R diffusers may be assembled in a variety of patterns to provide blows in one - two - three - and four directions . . . with the amount of air discharged in each direction proportional to the area being served. Agitair assures 100% air distribution in any shape area, from any location, without the use of blank-off's or oversized outlets.

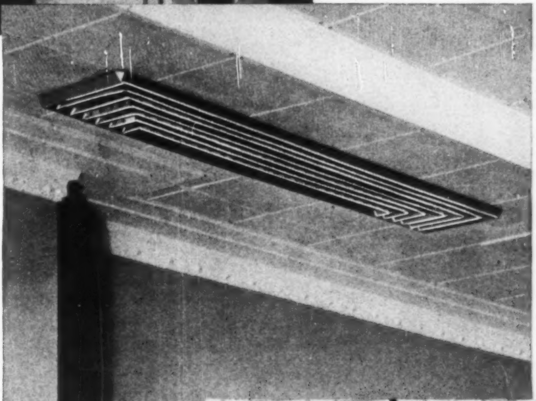
Write for Complete Data



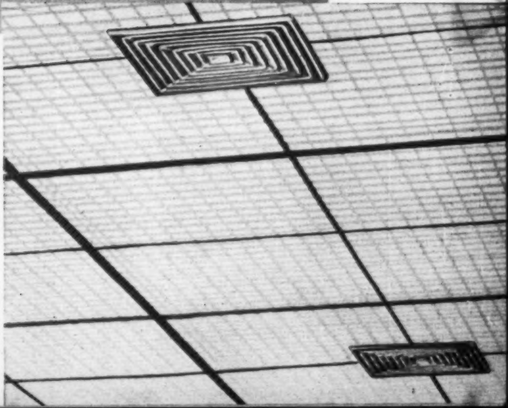
ONE WAY BLOW



TWO WAY BLOW

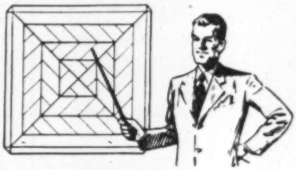


THREE WAY BLOW



FOUR WAY BLOW

Here's the Secret of Greater Diffusing Ability:



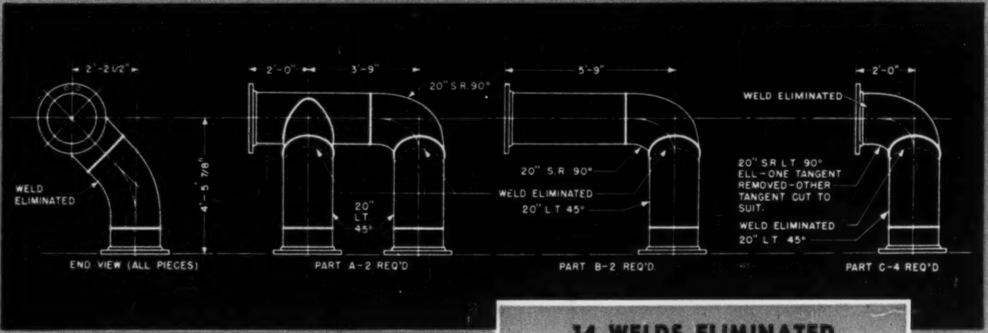
Patented built-in vanes deflect the air in numerous divergent streams resulting in turbulence at the point of contact with the aspirated air. Result: Rapid mixing, diffusion and temperature equalization.

AIR DEVICES Inc.

17 EAST 42nd STREET • NEW YORK 17, N. Y.

AIR DIFFUSERS • AIR FILTERS • ROOF EXHAUSTERS

12% COST REDUCTION. . .*in these piping subassemblies*


2'-2 1/2"
WELD ELIMINATED
4'-5 7/8"
END VIEW (ALL PIECES)
2'-0"
3'-9"
20" S.R. 90°
20" LT 45°
PART A-2 REQ'D
5'-9"
20" S.R. 90°
WELD ELIMINATED
20" L.T. 45°
PART B-2 REQ'D.
2'-0"
WELD ELIMINATED
20" S.R. L.T. 90° ELL-ONE TANGENT REMOVED-OTHER TANGENT CUT TO SUIT.
WELD ELIMINATED
20" L.T. 45°
PART C-4 REQ'D

14 WELDS ELIMINATED
9'-8" OF 20" PIPE SAVED

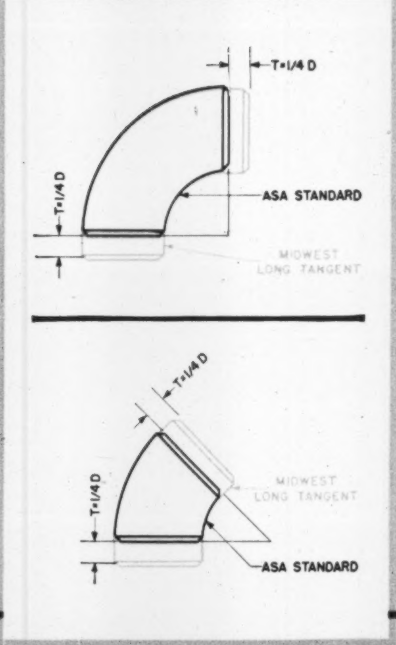
with MIDWEST

"LONG TANGENT" ELBOWS

Here is a concrete example of the extra cash value of Midwest "Long Tangent" Elbows. They saved 12% of the cost of this piping.

Each of the subassemblies shown above, if made of ASA elbows, would have required an extra nipple with an extra weld at the dotted line. With the Midwest Long Tangents, both the nipples and the welds were eliminated. Reduced material and labor costs made this substantial saving.

Other advantages of Midwest "Long Tangent" Elbows: pipe and fitting lined up more quickly and accurately, weld is removed from point of maximum bending stress, can be sleeved, slip-on welding flanges are more easily used, and they cost no more than standard elbows usually furnished. Ask for Catalog 48.

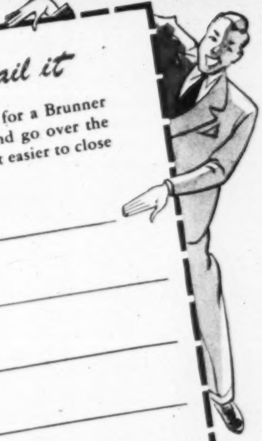

T=1/4 D
T=1/4 D
ASA STANDARD
MIDWEST LONG TANGENT
T=1/4 D
T=1/4 D
MIDWEST LONG TANGENT
ASA STANDARD

MIDWEST WELDING FITTINGS
Improve Piping Designs and Reduce Costs

MIDWEST PIPING & SUPPLY COMPANY, INC.
Main Office: 1450 South Second Street, St. Louis 4, Mo.
Plants: St. Louis, Passaic, Los Angeles and Boston • Sales Offices:
New York 7—30 Church St. • Chicago 3—79 West Monroe St.
Los Angeles 33—520 Anderson St. • Houston 2—1213 Capitol
Ave. • Tulsa 3—224 Wright Bldg. • Boston 27—426 First St.

BRUNNER SINCE 1906 **REFRIGERATION** helps you serve better

There are just two steps to closing more business



Just fill it in and mail it

We will know this is your request for a Brunner factory representative to stop in and go over the reasons why Brunner dealers find it easier to close business.

Name

Company

Address

City and State

THE FIRST STEP IS—*use this coupon*

With all the facts fresh in mind you will recognize the second step—recommend and install Brunner's from now on. With 69 models comprising a complete range of commercial capacities and types, a dependable source of supply and a known product with ready acceptance by your customers, selling obstacles are removed and you are on the way to bigger business. We will be looking for the coupon.

BRUNNER MANUFACTURING COMPANY
Utica 1, New York, U. S. A.

BRUNNER
SINCE 1906

REFRIGERATION CONDENSING UNITS
...a size and type for every purpose

AIR AND WATER COOLED MODELS
¼ HP. to 75 HP.

BRUNNER SINCE 1906

AIR CONDITIONING

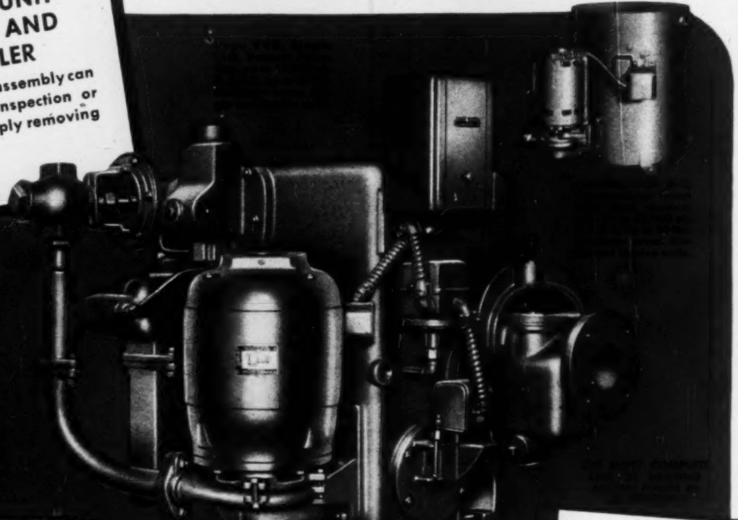
Self Contained Units in 4 sizes: 3-5-7½ and 10 HP.
Remote Installation Types from 3 to 75 HP.

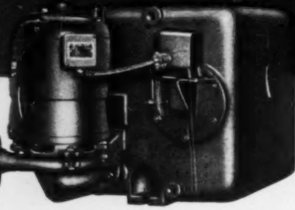
HOFFMAN · ECONOMY
CLOSE-COUPLED PUMPS

NEW !

SINGLE-UNIT MOTOR AND IMPELLER

Close-coupled assembly can be lifted for inspection or service by simply removing three bolts.

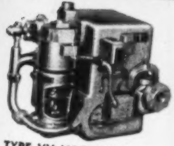




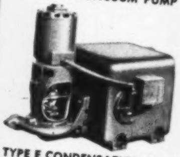
HOFFMAN
· ECONOMY

Close-Coupled Vacuum & Condensation Pumps

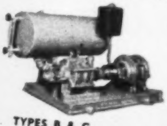
NOW—you can specify a genuine Hoffman-Economy Vacuum or Condensation Pump *where price is a factor* and benefit from the long, care-free service for which these pumps are noted. The new, one-piece pump head and motor mounting is a single casting, accurately machined to assure permanent alignment between pump and motor. The entire assembly can be easily removed *without disconnecting any piping.* Lower *first cost*—and *less man-hours* for servicing. The bronze impeller and casing have hand-finished water passages to minimize friction. The casing is equipped with a bronze wearing ring—a *long-life feature seldom found in low-price pumps.* These are just a few of the quality design features to be found in Hoffman-Economy Close-Coupled Pumps—now available. Write for prices and literature.



TYPE VV VACUUM PUMP



TYPE E CONDENSATION PUMP



TYPES B & C CONDENSATION PUMPS

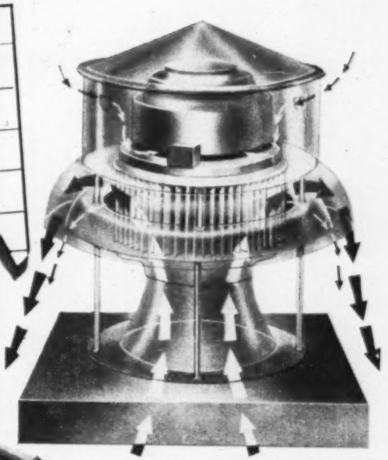
TYPE S CONDENSATION PUMP

HOFFMAN SPECIALTY COMPANY

PROBLEM: Ventilate Moisture or Corrosive Fumes

Unit must have motor out of airstream positive characteristics, rugged construction, low silhouette and be directly connected to duct system.

GALLAHER Air-Van POWER EXHAUSTERS



Pats. 2,526,290 2188741

If you have ventilation problems such as toilet exhausts chemical or food processes, laboratories, kettles, plating or kitchen hoods, a modern building or industrial plant where positive characteristics are combined with unique motor protection look to the economical and rugged Gallaher Air-Van.

Units *tested* and *certified* by an independent testing laboratory under the direction of a nationally recognized authority.

Capacities 150-12,000 CFM; Static Pressures to 1 3/4"

Vital Features

SAFE FUME HANDLING

Motor OUT of the airstream protects the most costly part of any fan. A positive air SEAL-OFF prevents passage of contaminated air into motor housing, eliminating most explosion-proof or special insulated motors . . . . a patented Gallaher exclusive feature.

POSITIVE UNIT

A necessity for maximum efficiency in handling contaminated air. The "Air-Van" is the only centrifugal power roof exhauster with SCROLL EFFECT allowing it to function against reasonable static pressures. A patented Gallaher exclusive feature.

DIRECT CONNECTED

Economy of installation . . . no penthouses. Economy of maintenance . . . only two bearings, no belt drive or backdraft dampers required.

LOW NOISE LEVELS

Special streamlined inlet, designed for quiet operation. Decibel ratings upon request.

WEATHERPROOF

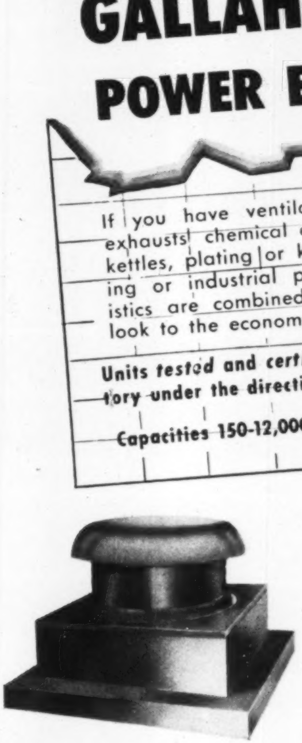
Overlapping umbrella outlet is weatherproof under most extreme conditions, such as ship-board deck installations.

SPECIAL METALS

Copper, Aluminum, Stainless Steel, Monel or any desirable special resistant finish.

RUGGED CONSTRUCTION

We invite you to compare "Air-Van" specification with any competitive unit.



CERTIFIED RATINGS

1700-27,000 CFM; Static Pressures to ⅛." Higher pressures can be handled in some instances.

NEW GALLAHER

Air-Max Power Exhauster

An axial-flow unit, designed to handle maximum quantities of dry uncontaminated air at minimum horsepower against minimum static pressures. Designed to supplement the Air-Van where ventilation requirements are not critical.

LOW SILHOUETTE

36" high on largest 27,000 CFM unit.

FULLY BLACKOUT

In line with defense specifications. Unit can be supplied without mushroom cover for upward discharge and with weatherproof dampers.

ECONOMICAL

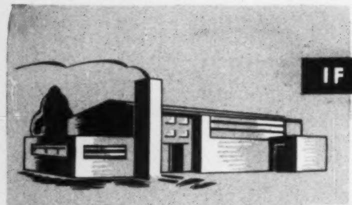
Complete package, direct connected and no field assembly. 4 or 6 balanced fan blades of high strength aluminum alloy, designed for field replacement without purchase of entire new wheel.

GALLAHER Air-Van
POWER EXHAUSTERS
The GALLAHER Co.

●Write for Complete Catalogs or see your Gallaher Representative. Ask for unique demonstration using transparent operating model.

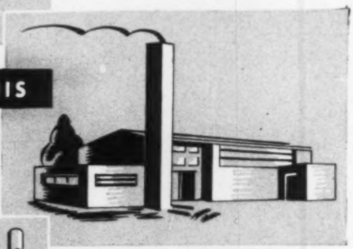
The GALLAHER Company

Omaha, Nebr. **Owatonna, Minn.**



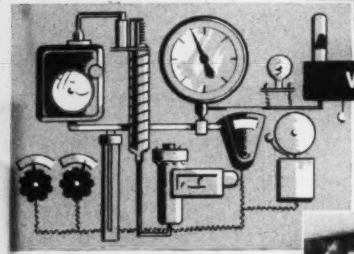
IF YOU WANT THIS

The modern functional school is characterized by trim lines and concise design . . . a low chimney.



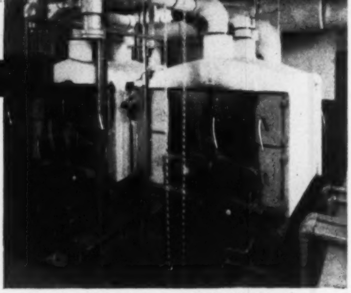
INSTEAD OF THIS

Conventional types of horizontal, return-flue or tube boilers require tall, long-draft chimneys out of keeping with building style.



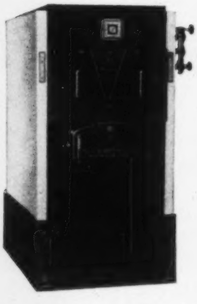
WITHOUT THIS

Complicated controls and noise of operation are necessary adjuncts when a "package unit" boiler is used with a low chimney.

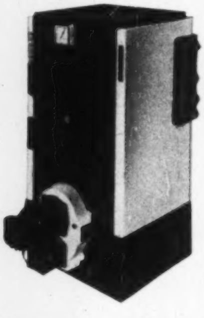


USE THIS

H. B. Smith *low-draft* cast iron boilers meet all heating requirements without tall chimneys or extra controls. This installation is in a Connecticut school.



SMITH-MILLS "20" BOILER for Hand Firing. These smaller H. B. Smith Boilers have the same vertical flue travel, hence the same low-draft requirements as do the famous big "MILLS" Boilers.



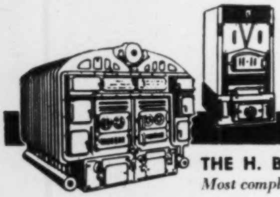
SMITH-MILLS "1100" BOILER-BURNER UNIT. A complete heating plant for the average home — equipped with oil burner and tankless heater. Extended type jacket available.

Minimum draft resistance is assured in the design of H. B. Smith boilers. The hot gases rise between the gray iron vertical water tubes before passing into the side flues. Maximum heat is transferred from the gases to the water in the tubes.

Boilers of the return-flue, or long-fire-tube type, require stronger draft — call for tall chimneys or mechanical draft with elaborate controls . . . none of which are needed with H. B. Smith low-draft boilers.

Result? Low chimneys and freedom from noise, vibration or the danger of draft-control instrument failure. Add space saving, extra long life, economy of operation, low maintenance costs—and sectional construction features that permit the boiler to *grow with the need* — and you see why architects, engineers and contractors recommend H. B. Smith Boilers with full confidence.

You may be interested to know that H. B. Smith manufactures the most complete line of modern cast iron boilers in the world. Let us help you satisfy your customers with convincing data and case histories.



H. B. Smith

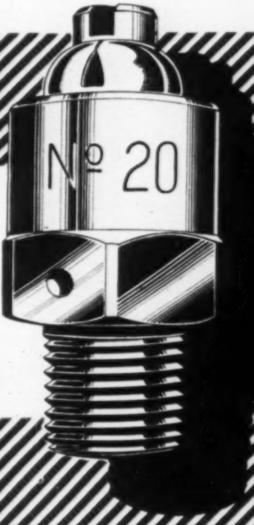
CAST IRON BOILERS

THE H. B. SMITH CO. INC., WESTFIELD, MASS.

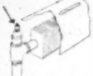
Most complete line in the world of cast iron boilers for heating

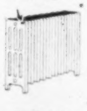
3 Remarkable New Items

For Customer Satisfaction



Basement or Ceiling Main, High Point

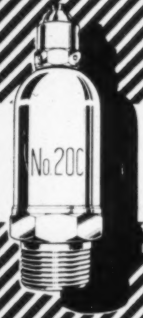

Baseboard


Radiators

Convectors

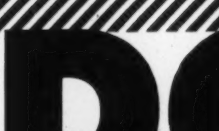
Completely automatic, it eliminates air from convectors and radiators. No preliminary soaking is required. This simple, ingenious valve works equally well on new or existing heating plants with forced circulation or gravity systems. Simple to install — Easy to select the function you desire, manual or automatic venting or manual shut-off.

DOLE-20 HOT WATER AIR VALVE



DOLE CHAMBER VENT

A combination hot water air valve and air chamber that is fully automatic. Designed specially for venting convectors, etc. on hot water heating systems. Available in ⅛″, ¼″, ½″ & ¾″ I.P.T. sizes.



DOLE FLOW CONTROL VALVE

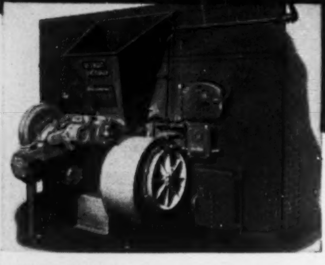
A simple, practical valve that regulates water flow. Limits discharge to a pre-determined gallonage regardless of city water pressure from 15 to 150 lbs. p.s.i. No more cool water from overdrawn tankless heaters. Many other uses.

DOLE

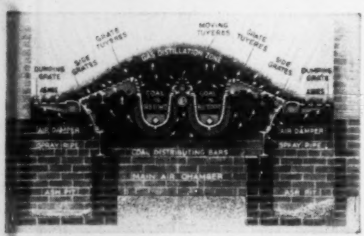
No. 20 HOT WATER AIR VALVE
CHAMBER VENT
FLOW CONTROL VALVE

CONTROL WITH DOLE

use
DETROIT STOKERS



DETROIT UNISTOKER Single retort underfeed with Adjustable Coal Feed Control.



MOVING TUYERES
GRATE TUYERES
GRATE TUYERES
SIDE GRATES
SIDE GRATES
GAS DISTILLATION ZONE
DUMPING GRATE
DUMPING GRATE
ASHES
ASHES
COAL IN RETORT
COAL IN RETORT
AIR DAMPER
AIR DAMPER
SPRAY PIPE
SPRAY PIPE
COAL DISTRIBUTING BARS
MAIN AIR CHAMBER
ASH PIT
ASH PIT

DETROIT DOUBLE RETORT A multiple retort—side cleaning underfeed for medium sized boilers. No basement required for ash removal.

[illegible] Retort. Burns wide range of fuel—[illegible] fluctuating loads. [illegible]

[illegible]

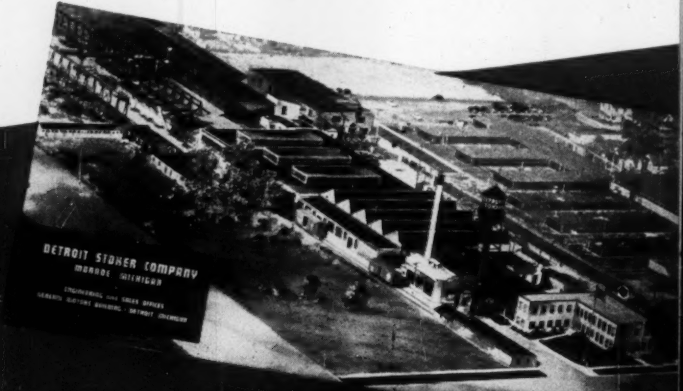
We build stokers adaptable to any type or make of boiler or steam generator. No matter what you are considering we can furnish the ideal stoker—the one that fits the furnace and is best suited to your operating conditions.

Detroit Stokers are successfully operating in thousands of boilers of different types, from firebox heating boilers to large steam generators of over 300,000 pounds of steam per hour, capacity. They are installed in private and public institutions, buildings, industrial and power plants, here and Abroad.

Assembled and Inspected In Our Plant Before Shipment

Each stoker that we design and build is assembled by experts in our plant and carefully inspected prior to shipment. You can't go wrong with Detroit.

Built to outlast the boilers that they serve, Detroit Stokers give you the best, most economical firing method for your needs. An informal discussion with one of our Engineers will cost you nothing and might save you a lot. May we hear from you?



DETROIT STOKER COMPANY
MONROE MICHIGAN
ENGINEERING AND SALES OFFICES
GENERAL MOTORS BUILDING - DETROIT MICHIGAN

DETROIT STOKER COMPANY

DETROIT
STOKERS

GENERAL MOTORS BUILDING, DETROIT 2, MICHIGAN
District Offices in Principal Cities . . . Works at Monroe, Michigan

Wagner
ELECTRIC MOTORS
... the choice of leaders
in industry

it *pays* to be particular about your choice of motors

Choose Wagner Motors for...

longer life . . . greater dependability and *service when and where it's needed!*

The selection of the *right* motor to power your product is all important. Uniform troublefree performance, dependable long-life operation, the reputation of the manufacturer, and his ability to provide immediate repair parts and service — *when* and *where* they're needed, are all factors that mean satisfied customers for you. You'll save time, money, and worry if you choose from the Wagner line because:

1. **Wagner Motors are backed by a liberal warranty.**
2. **They are available in a wide range of types and sizes for every application.**
3. **Improved engineering features assure long life and efficient operation.**
4. **They are available from Wagner Branches in all principal cities.**
5. **More than 650 Wagner Authorized Service Stations and Parts Distributors plus 25 Wagner-owned Service Branches provide on-the-spot service, replacement motors, or genuine repair parts.**

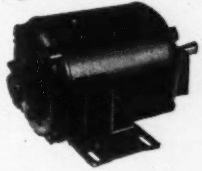
Regardless of what your motor requirements may be, Wagner can furnish the *right* motor to fit your need. Bulletin MU-185 gives complete information—write for your copy.

Wagner Capacitor-Start Motors

Wagner type RK motors are your best choice for use where capacitor-start fractional horsepower motors are desired. They are designed for use in applications where starting loads are fairly heavy, but which can be brought up to operating speed quickly.

They are available with either sleeve or ball bearings; in open or totally-enclosed types, with rigid or resilient bases or with a machined end plate for flange mounting. They are built in ⅛, ⅙, ¼, ⅓, ½, and ¾ horsepower ratings.

If you need motors in larger sizes, you can't beat the famous Wagner single-phase repulsion-start induction motor for low upkeep cost, freedom from vibration and noise, and years of reliable service. It's the standard by which all other single-phase motors are judged.



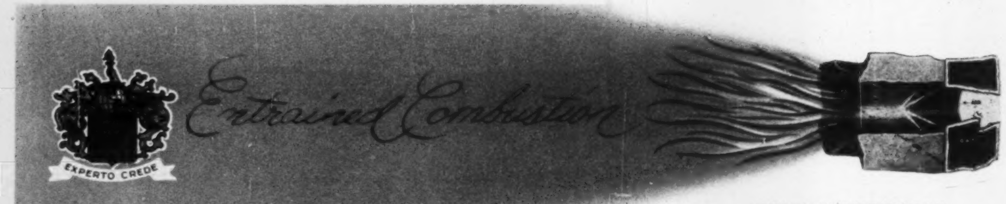
Wagner
Electric Corporation
1891 WE 1951

WAGNER ELECTRIC CORPORATION
6370 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

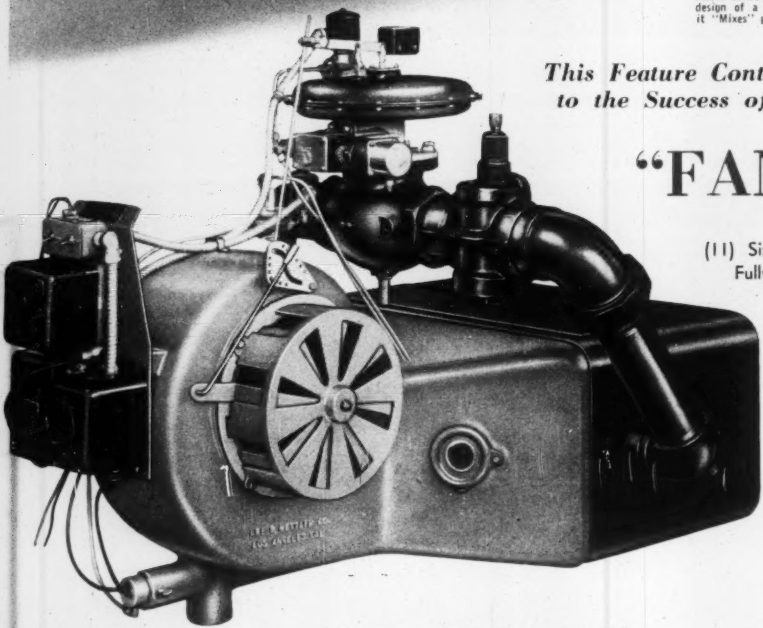
BRANCHES IN 31 PRINCIPAL CITIES

MS1-4



THERE'S A DIFFERENCE IN GAS BURNERS

Above sectional view depicts the EXCLUSIVE and unique design of a METTLER BURNER CASTING. Note how it "Mixes" gas and air.



This Feature Contributes to the Success of . . .

"FAN-AIR"

(11) Sizes—5 to 500 H.P.
Fully "PACKAGED"

Model 32F-3
300 H.P.

For Your Protection and Safety

Automatic Motorized Fan MECHANICAL DRAFT Gas Burner Assembly

A Complete and Fully Automatic Gas Burner System

SOME OF THE PRINCIPAL BENEFITS AND ADVANTAGES ARE:

- ✓ Electric "On & Off" Plus Modulating Fuel Control
- ✓ "Spark" Ignited Mettler Rectifier Safety Pilot
- ✓ Dependable Electronic Flame Safety Relay
- ✓ 100% Instant Fuel Shutoff Upon Flame Failure
- ✓ Requires Less Stack & Furnace Draft
- ✓ Small Furnace Volume—is More Effective
- ✓ Develops Greater Steam Generation
- ✓ No Hot Spots in Furnace—Noiseless Combustion
- ✓ More Uniform Distribution—Improved Turndown Ratio
- ✓ Eliminates "Popping & Backfiring"
- ✓ Produces Higher Efficiency—Highest Safety Factor
- ✓ Tested & Coordinated Prior to Shipment
- ✓ Simplifies & Lowers Installation Costs
- ✓ Operates Under Natural Draft Too

Why Buy Old Style Burners When All These Tangible Advantages Are So Readily Available?

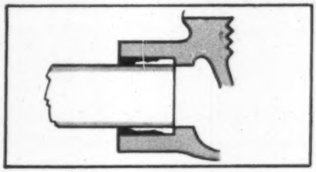
PROMPT SHIPMENT OF ALL SIZES

THE METTLER CO. INC.

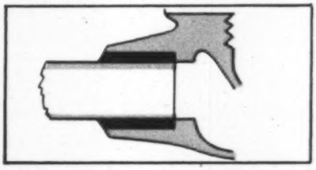
4366 WORTH ST. • LOS ANGELES 63, CALIF.

MAKE SOUNDER SOLDERED JOINTS

WITH O-B
SOLDER TYPE VALVES



The pipe ends of some valves are thick and heavy and this excess metal makes them slow to heat, resulting in uneven heat distribution and an uneven flow of solder (note diagram) in the space between the tubing and the pipe end. The soldered joint may hold temporarily but undue strains are apt to cause it to leak.



Good copper-to-copper connections result from capillary attraction, drawing molten solder into the space between the valve pipe end and the inserted tubing. This action is aided by the tapered design of all O-B valve pipe ends which heat up quickly and evenly, allowing the solder to completely fill the joint space and produce a sound, leaktight joint.

Better copper-to-copper connections result when you use O-B solder-type valves.

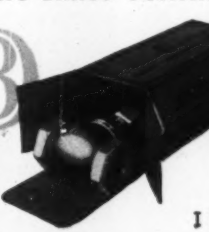
By careful streamlining, O-B has eliminated heat-wasting excess metal without reducing the over-all strength of the soldered joint. The tapered pipe end heats up quicker and allows a more even distribution of heat to the inserted tubing. The result is a smooth even flow of solder which completely fills the joint space and produces a sound, leaktight soldered connection.

Strength of this soldered joint is not lessened by the streamlining of the pipe ends. By taking advantage of the inserted tubing for reinforcement, the resulting connection is more than equal to the strength of the tubing.

A complete line of O-B low pressure globes and gates with solder-type ends are available from your local Ohio Brass distributor. He will be glad to help you with any of your valve problems.

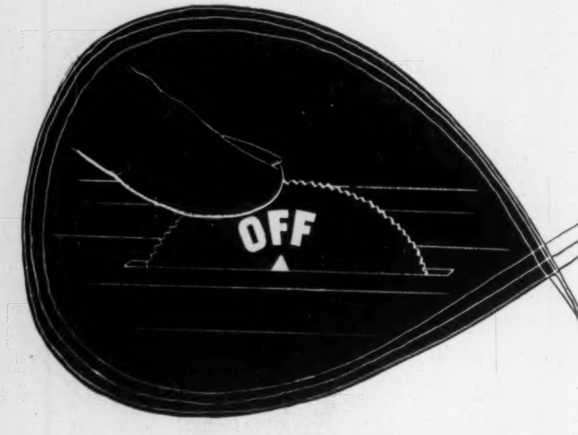
OHIO BRASS COMPANY, MANSFIELD, OHIO

4065 V



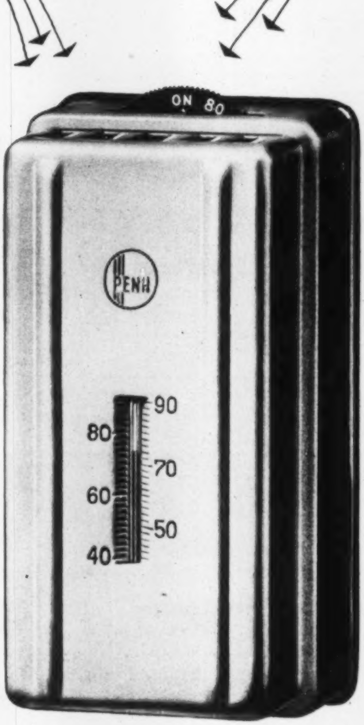
Ohio Brass VALVES

FOR DOMESTIC AND INDUSTRIAL USE



selective control

for Unit Heaters gives greater fuel economy year 'round efficiency!



In plant after plant . . . results are always the same. When *each unit heater* is controlled by a PENN heat-anticipating thermostat with the famous *built-in "ON-OFF" switch* . . . fuel saving and year 'round efficiency go up!

During winter months, the PENN heat anticipating thermostat holds temperatures closely to the selected level . . . wasteful zig-zag heating is eliminated. Then the "ON-OFF' switch prevents heat from pouring into areas where it's not required. A mere rotation of the dial to "OFF" position stops heat flow during idle plant periods . . . or to little-used areas . . . or to areas exposed for long periods to outside temperatures such as receiving or shipping rooms.

In summer months, this same "ON-OFF' switch permits manual control of fan operation for ventilation *without* installing an additional switch.

Learn more about this *better control* for unit heaters. Ask your manufacturer, wholesaler or write **Penn Electric Switch Co., Goshen, Ind.** Export Division: 13 E. 40th Street, New York 16, U.S.A. In Canada: Penn Controls, Ltd., Toronto, Ont.

PENN

AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, PUMPS, AIR COMPRESSORS, ENGINES, GAS RANGES

YOU ARE

Cordially Invited

TO INSPECT THE COMPLETE LINE OF

Staynew

FILTERS

BOOTH 408

INTERNATIONAL
HEATING & VENTILATING EXPOSITION

JANUARY 22-26
PHILADELPHIA, PA.

DOLLINGER

There is only one unit heater with

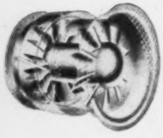
REVOLVING

discharge outlets

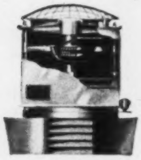
•

Wing

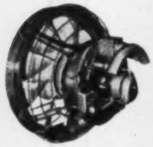
VARIABLE TEMPERATURE HEATER SECTIONS



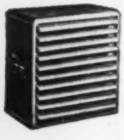
MOTOR-DRIVEN BLOWERS



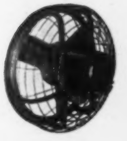
TURBINE UNIT HEATERS



TURBINE-DRIVEN BLOWERS



UTILITY UNIT HEATERS



SAFETY VENTILATING FANS

WING
Revolving
HEATER

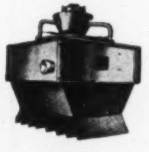
THE first overhead suspended unit heater discharging vertically downward was the Wing Featherweight Unit Heater with stationary discharge outlets. The first unit heater with revolving discharge outlets was, and still is the Wing Revolving Unit Heater.

Only by means of the slowly revolving discharge can a room or building be heated evenly, thoroughly and comfortably. No fixed discharge outlet, however complicated, adjustable or replaceable, can distribute the warmed air throughout the working area without causing uncomfortable hot blasts or leaving cold spots—or doing an inadequate job of heating.

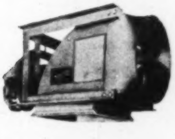
The Wing Revolving Heater, by means of its slowly moving discharge outlets, lays an even, gently stirring blanket of pleasantly warmed air over the working area, searching out remote corners, moving around and under obstructions and creating a healthful, live, invigorating atmosphere for the workers.

If you want specific information, consult Sweet's Catalog Files for the name of the nearest Wing Representative, or write direct.

L. J. Wing Mfg. Co., 140 Vreeland Mills Road, Linden, N. J., U.S.A.

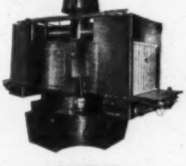


HIGH VELOCITY FIXED
DISCHARGE UNIT HEATERS

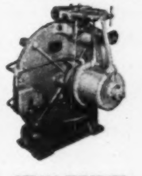


DUCT FANS
Elbow Type

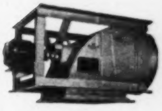
DUCT FANS
Straight Line Type



GAS-FIRED
UNIT HEATERS



STEAM TURBINES



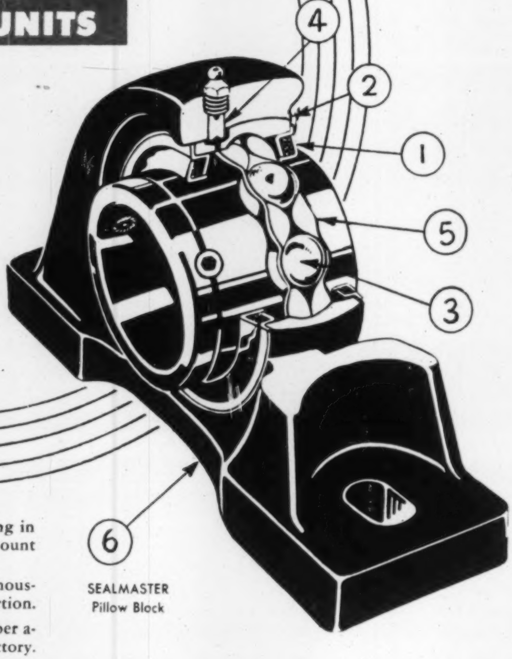
FURNACE DRAFT
INDUCERS

DEPENDABLE

6 features assure unexcelled performance from

SEALMASTER BALL BEARING UNITS

Good bearing performance...quiet operation...long life and low maintenance are all results of the combination of design and construction features found only in SEALMASTER units. Fans, blowers and all types of similar equipment perform better, last longer and give customer satisfaction when equipped with SEALMASTERS. Check the list below and then write us for a copy of catalog 845 . . . it gives complete details on the entire SEALMASTER line, including dimensions and load ratings.



SEALMASTER
Pillow Block

SPECIFICALLY, *Here's Why SealMasters Excel:*

❶ **PERMANENTLY SEALED!** Felt-lined steel flinger rotating in labyrinth prevents entry of dirt and retains proper amount of lubricant.

❷ **SELF-ALIGNING!** Bearing unit, with seals independent of housing, can align itself in any direction without seal distortion.

❸ **PRE-LUBRICATED!** Bearing chamber is filled with proper amount of lubricant before shipment from SealMaster factory.

❹ **NO HOUSING WEAR!** Patented locking pin and dimple prevent rotation of outer race in housing. This eliminates housing wear...permits shaft alignment and positions unit for relubrication.

❺ **FLOATING RETAINER!** Ball retainer is designed to float on ground inner surface of outer race. Trap lubricant and prevents churning.

❻ **HOUSING DESIGN!** SealMaster's cast housings combine rigid, one-piece construction with smooth streamlined appearance.

Write for your copy of Catalog 845...gives dimensions and load ratings for pillow blocks, flange units, take-up units, Cartridge units and flange-cartridge units.

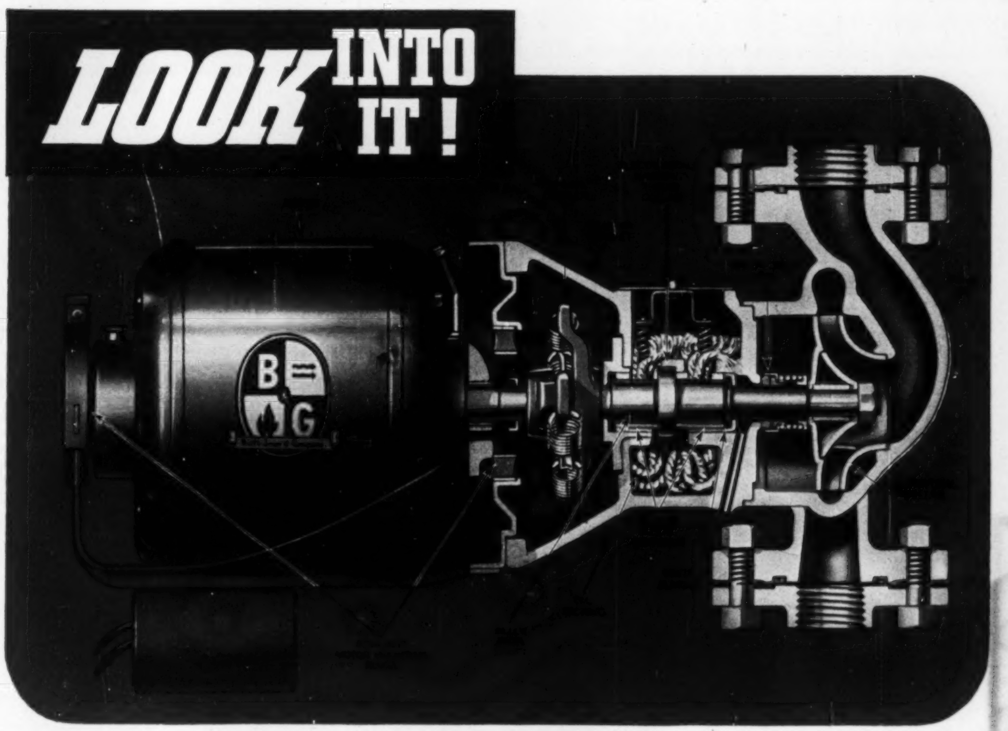
BEARING DIVISION

STEPHENS-ADAMSON

47 RIDGEWAY AVENUE, AURORA, ILLINOIS
MFG. CO.
LOS ANGELES, CALIF. ★ BELLEVILLE, ONT.

Factory Representatives and Dealers in All Principal Cities

LOOK INTO IT!



COMPARE THE B&G BOOSTER WITH ANY OTHER PUMP!

If you want to know why the B & G Booster has such a priceless reputation for dependability and long service, just examine the features revealed in the above cut-away. *It's a pump worth looking into!*

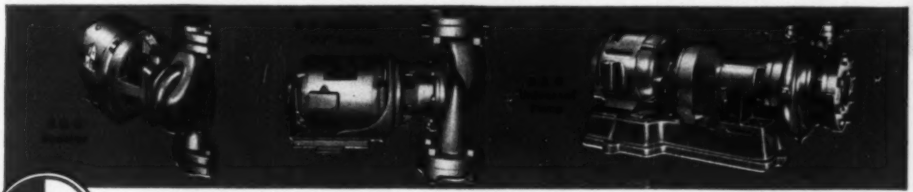
Viewing from left to right, first note the Motor—cradled in rubber and specially developed for quiet operation. Next, the *exclusive* spring-type Coupler—keeps noise at a minimum. Then the Shaft—polished special alloy steel of finest quality, with electronically-hardened thrust collar. It rotates in long Bronze Bearings which assure alignment and smooth operation. Oil from the reservoir is brought to the Bearings by the wicking for thorough lubrication.

Next, the Watertight Seal—positively excludes water from the bearings. And finally, the Impeller—hydraulically balanced, close-fitted to the pump body, highly efficient.

The B & G Booster is not only better designed but *precision built!* Johannson gauges are used throughout in construction and assembly. This use of precision instruments assures positive accuracy of fit, simplified servicing and complete interchange of parts from one pump to another.

When you install a B & G Booster, you protect your reputation, your profit and your peace of mind.

EVERY PUMP CAPACITY FOR MOST EFFICIENT PERFORMANCE . . .

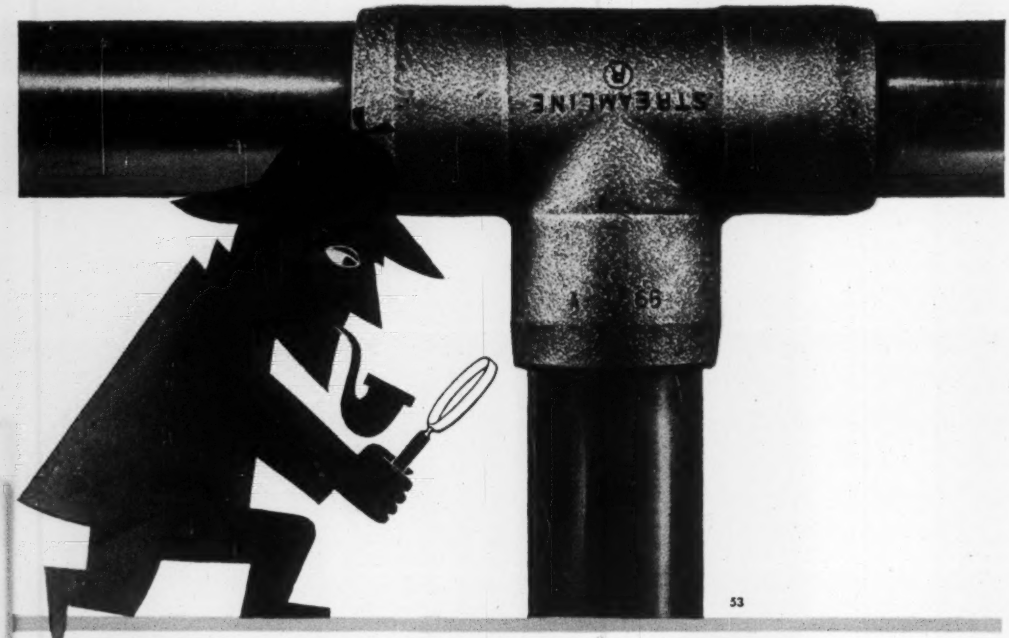


Hydro-Flo* Heating Pumps

By the Makers of B & G Hydro-Flo Forced Hot Water Heating System Equipment . . .
Water Heaters . . . Centrifugal Pumps . . . Heat Exchangers . . . Refrigeration Equipment

BELL & GOSSETT COMPANY • Dept. HW-5, Morton Grove, Ill.

solved: the case of the cost-minded customer



Streamline® COPPER TUBE AND SOLDER TYPE FITTINGS

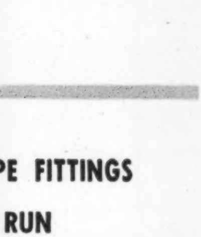
COST LESS TO INSTALL — COST LESS IN THE LONG RUN

The mystery of how to sell a cost-minded customer an all-copper supply and drainage system is neatly solved — with STREAMLINE products. For he can easily be shown the savings in installation time and the value of extra years of service of a STREAMLINE copper installation as compared to a rustable ferrous system.

The time required for roughing-in is cut down — because the uniform depth of STREAMLINE solder joints make it easy to compute the exact length of tubing needed. The time required for handling is much less because copper tubing is approximately one-third the weight of iron pipe of the same length and size. (Being threadless, copper tube walls need be only one-third as thick.) Installation time is further decreased because no heavy, bulky pipe vise or stock and die are needed. For drainage and industrial piping time is also saved because STREAMLINE tube sizes, even up to 10", are produced in 20 ft. lengths. A STREAMLINE installation not only reduces total job cost to the customer — it also increases the number of jobs a contractor can handle per month.

The extra years of service that any customer will get in a STREAMLINE installation is guaranteed by two facts: (1) It is all copper which cannot rust and (2) it is a snug-fitting, tightly joined system that tests leak-proof on the first try and won't develop leaks later. The years of pioneering, development, engineering and mauufacturing experience of the Mueller Brass Co. guarantees an installation that is permanent and trouble-free.

See your jobber for further information or write for Catalog S-350 and W-250 describing the complete line of cast supply and drainage fittings and the complete line of wrought fittings through 4".



MUELLER BRASS CO. STREAMLINE PRODUCTS

MUELLER BRASS CO., PORT HURON 1, MICHIGAN

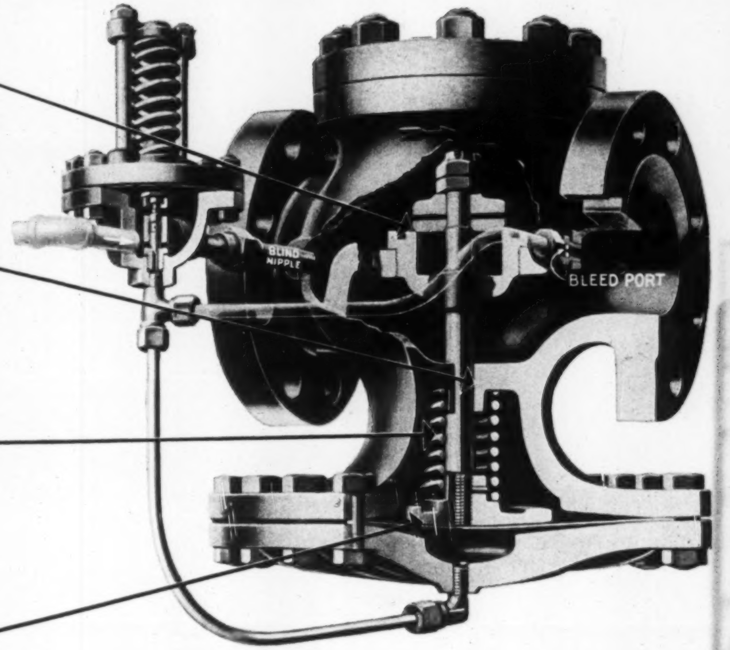
WHY Spence Regulators Outlast The Field

SECO METAL SEATS AND DISCS — Durable SECO Metal resists wiredrawing. More than twenty years of experience in thousands of installations has failed to produce a single case where SECO Metal has been cut by steam.

PACKLESS CONSTRUCTION — All Spence main valves and most pilots are built without stuffing boxes. This minimizes friction . . . eliminates much time-consuming maintenance.

SPRING OUT OF PATH OF STEAM — The spring in the Spence Regulator is out of the path of the steam or other fluid flowing through the valve. It operates at low unit stress for exceptionally long life.

LARGE BALANCED DIAPHRAGM—Spence metal diaphragms, under usual conditions, never require replacement. Spence Regulators have few moving parts and those few are ruggedly constructed and seldom require attention.



Spence Type EQ back pressure regulator — operation of main valve is controlled by a sensitive pilot to regulate the initial pressure. Same pilot is used with all sizes of main valves.

The features shown above explain why you profit on every important count with Spence Pressure and Temperature Regulators.

Learn more about these and many other advantages of Spence Regulators by sending for Bulletin 350.

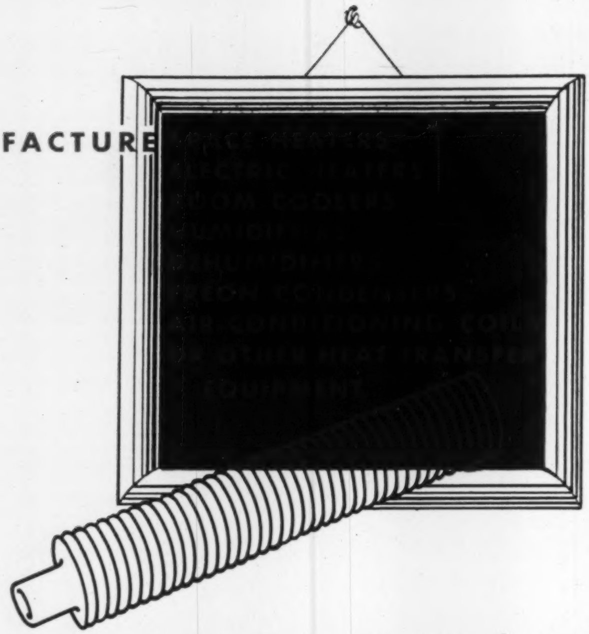
DURABILITY	Spence Regulators perform dependably year after year.
ACCURACY	You can be sure of accurate control for the life of the regulator.
MAINTENANCE	You don't need expensive repairs or special maintenance. That means less down-time, less time and money wasted on replacement of parts.

SE-110

SPENCE ENGINEERING COMPANY, INC.
WALDEN, NEW YORK

Spence

IF YOU MANUFACTURE SPACE HEATERS ELECTRIC HEATERS ROOM COOLERS HUMIDIFIERS DEHUMIDIFIERS FREON CONDENSERS AIR-CONDITIONING COILS OR OTHER HEAT TRANSFER EQUIPMENT



WOLVERINE TRUFIN* SHOULD BE PART OF YOUR PICTURE

Trufin, as you know, is a finned tube with the fins integral with the tube itself, which permits it to withstand vibration and sudden temperature changes. This reflects in more efficient performance.

Since Trufin greatly increases the surface area (in many cases, an inch of Trufin will equal 9 inches of plain tube), you can visualize the space you can save by using Trufin.

You achieve the advantage of getting increased efficiency from your present sized unit, or equal efficiency from a more compact unit.

*Reg. U.S. Pat. Off.

Trufin is available in solid copper, solid aluminum, and in bi-metal with copper or copper alloy liner and aluminum fins. Trufin is manufactured in a variety of diameters and fin spacings and heights.

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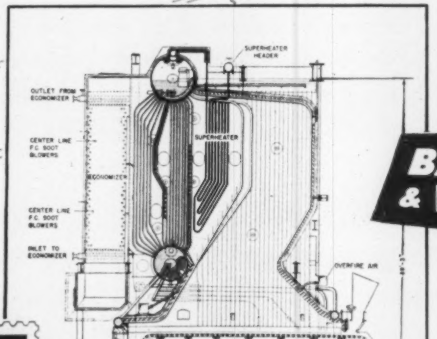
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THE EDITOR'S PAGES

Two EDITORIAL features appear in this issue of HPAC. One of them is the annual Directory Section of heating, piping, and air conditioning equipment for industrial, commercial, institutional and public buildings—which has been thoroughly revised and brought up-to-date. The other special feature is the Show Section, which "previews" the 10th International Heating, Ventilating and Air Conditioning Exposition in Philadelphia, January 22-26, and which contains complete information on the 57th annual meeting of the American Society of Heating and Ventilating Engineers, to be held in the same city that same week. . . . As is usual each January, these features are in addition to our regular monthly editorial content, including the ASHVE Journal Section.

IF YOU'RE GOING TO PHILADELPHIA . . .

IF YOU PLAN to be in Philadelphia later this month for the International Heating, Ventilating and Air Conditioning Exposition and the annual meeting of the ASHVE, study in advance the special Show Section published in this issue and check the products and equipment to be displayed so you won't miss what you want to see when you get there.

It's a good idea to take your copy of HPAC along with you to Philadelphia so that you'll have it at hand for ready reference during the busy week there.

NEW ALLOYS AID STRATEGIC METALS PROBLEM

FUTURE NATIONAL emergencies will find American industry better able to meet shortages in critical metals than it was in World War II, according to James D. Nisbet, head of the metallurgical materials and process division of the General Electric research laboratory, Schenectady, N. Y.

Mr. Nisbet told a joint meeting of the American Institute of Electrical Engineers and the Berkshire Society of Metals, at Pittsfield, Mass., that "on the basis of current hypothesis, we should be able to alter the composition of alloys in such a way that strategic materials are, in a large degree, eliminated."

Specifically mentioning titanium, he said that "because the fundamental properties of titanium and iron have certain similarities, it is reasonable to expect that titanium alloys will be developed in the near future which will have properties comparable to steel."

MAYO BUILDINGS BEING AIR CONDITIONED

THE MAYO ASSOCIATION is now building a medical science building for the use of the Mayo Foundation and a new diagnostic building for the use of the Mayo Clinic, at Rochester, Minn. Both of these structures will be equipped with complete air conditioning equipment for winter and summer comfort control.

The equipment in the present buildings of the Association will be remodeled at a later date so as to install the summer cooling cycle.

Chilled water for the summer cooling cycle will be obtained from a central refrigeration plant now being planned.

Articles describing the air conditioning applications in the buildings and the central refrigeration plant are planned for future issues of HPAC.

INDEX FOR 1950 TO BE AVAILABLE ON REQUEST

AN INDEX for HPAC's 1950 issues, Vol. 22, Nos. 1-12, including the Journal Section of the American Society of Heating and Ventilating Engineers, is being compiled and will be available soon to HPAC's subscribers on request. If you want a free copy, send a note or postcard to the Editor, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2.

We'll keep your request on file until the index has been printed, and will then mail a copy to you.

AUTOMATIC CONTROLS CUT ATOMIC ENERGY HAZARDS

HOW AUTOMATIC temperature, humidity, static pressure and air velocity controls are used to minimize the hazards in atomic energy plants was explained recently by J. A. Cutler, president of Johnson Service Co.

According to Mr. Cutler, there are three broad areas of application of automatic control apparatus in atomic energy plants. As an initial consideration, he said, plants where radioactive materials are handled almost always are equipped with complete air conditioning systems, and automatic temperature control apparatus is called upon to solve the same problems encountered in any first-class industrial building. Consequently, many thousands of standard regulators have been installed in these plants for operation in the usual manner. However, many special considerations arise because of the hazards of atomic energy work.

For instance, a second type of control application is specifically related to the presence of radioactive materials. In most plants dealing with radioactive materials, this involves the precise control of the movement of air within each building to keep contamination at a minimum.

A typical building may have several zones of activity, each varying in its degree of exposure to radioactive materials, he pointed out. General office areas, receiving and shipping rooms and maintenance areas are termed "safe" and may be said to comprise "Zone 1." "Zone 2" includes less safe areas where some process work involving radioactive materials is done. "Zone 3," called a "hot" zone, includes all other areas of the building.

In most cases, he revealed, the buildings are air conditioned for year around service. Air for heating or cooling is supplied to each zone separately, with thermostats and automatically controlled valves and dampers provided to maintain the building at the desired temperature.

Unlike the problems of controlling ordinary air conditioning systems, however, it is necessary, with radioactivity present, to insure that the air always flows from a safe zone to a less safe zone. The various zones are isolated from each other by walls, with traffic between zones having to pass through air locks.

As an added safeguard, Mr. Cutler said, each zone is equipped with a comprehensive system of static pressure control. Zone 1 is maintained at the highest pressure, Zone 2 at the next highest pressure, and Zone 3 at the lowest pressure. Since there is always some leakage through the walls between zones, and also the possibility of someone leaving an air lock open, the static pressure control arrangement insures that any air flow will be from a safe to a less safe zone. Safety devices sound an alarm if air flows in the wrong direction.

Mr. Cutler also explained that much of the space within a building handling radioactive materials may consist of hot-zone laboratories in which special fume hoods are installed for the treatment of materials. The use of these fume hoods, which are connected to exhaust ducts to provide a positive air movement to remove radioactive fumes and other toxic gases, has resulted in the development of the third and newest application of automatic control apparatus in atomic energy plants.

For safety, the velocity of the air through the hood door should be at least 125 fpm, he said. However, if this velocity is above about 175 fpm, some radioactive particles undergoing processing are carried away. It is necessary, therefore, to control the velocity of air through the hood door between these limits. This problem is made more difficult because the hood door may be anywhere from wide open to almost completely closed and because of available resistance in the system when filters become dirty.

Recognizing the problem when fume hoods of this type were first proposed two years ago, a test installation, consisting of an exhaust system and two typical hoods, was built. Exhaustive tests were conducted to develop a workable control arrangement.

Several means of detecting changes of velocity were tried. The pressure difference method of velocity control, which finally was adopted at Argonne and Hanford as a result of the tests, depends for its operation on the fact that the velocity of air, moving between two points, is proportional to the difference in pressure between these points. In the case of air moving at a velocity of 130 fpm, this pressure difference is 0.001 in. water gage. To control the velocity at 130 fpm, within plus or minus 10 fpm, the control instrument must respond to a pressure variation of 0.0001 in.

The successful regulation of contamination in atomic energy plants by means of these automatic control installations is an economy measure as well as a health measure, according to Mr. Cutler, since expensive laboratory apparatus and equipment must be replaced if they become radioactive.

ASRE HONORS REFRIGERANT DEVELOPMENT

Public recognition to the three men principally responsible for the development of the "Freon" family of refrigerants was made by the American Society of Refrigerating Engineers during the 46th annual meeting of the society in New York last month.

A "certificate of recognition" was presented to Thomas Midgley, Jr., posthumously, and to Dr. Albert L. Henne and Robert R. McNary. The ASRE awards committee selected the development as the most important single contribution made in the last 20 years to the growth and advancement of the refrigeration industry. It was through the brilliant work of Midgley, Henne and McNary that the substance (dichlorodifluoromethane), known today as "Freon-12," was determined to be nontoxic, nonflammable and satisfactory as a refrigerant.

RADIATOR TRAP AND VALVE RECOMMENDATIONS

Proposed Simplified Practice Recommendations for Low Pressure Thermostatic Radiator Traps and Float and Thermostatic Traps, and for Unorificed Radiator Supply Valves, have been submitted to producers, distributors, users, and others for acceptance or comment, the commodity standards division of the office of industry and commerce, U. S. Department of Commerce, reported last month.

The recommendations were proposed by the Steam Heating Equipment Manufacturers Association. Purpose is to direct attention to the sizes, patterns, and capacities of these traps and valves that currently are in general use and demand, and are regarded as affording an adequate selection for ordinary use and for stock. Definitions and general provisions are included as related and useful information.

Mimeographed copies of the recommendations may be obtained from the commodity standards division, Washington 25, D. C.

PROCESS CONTROL ORDERS SOAR

Industrial process control instrument makers, now facing the possibility of an alltime production record, are ready to repeat or better the emergency production peaks they made during World War II. The industrial instrument outlook was revealed at the mid-yearly meeting of the recorder-controller section of the Scientific Apparatus Makers Association.

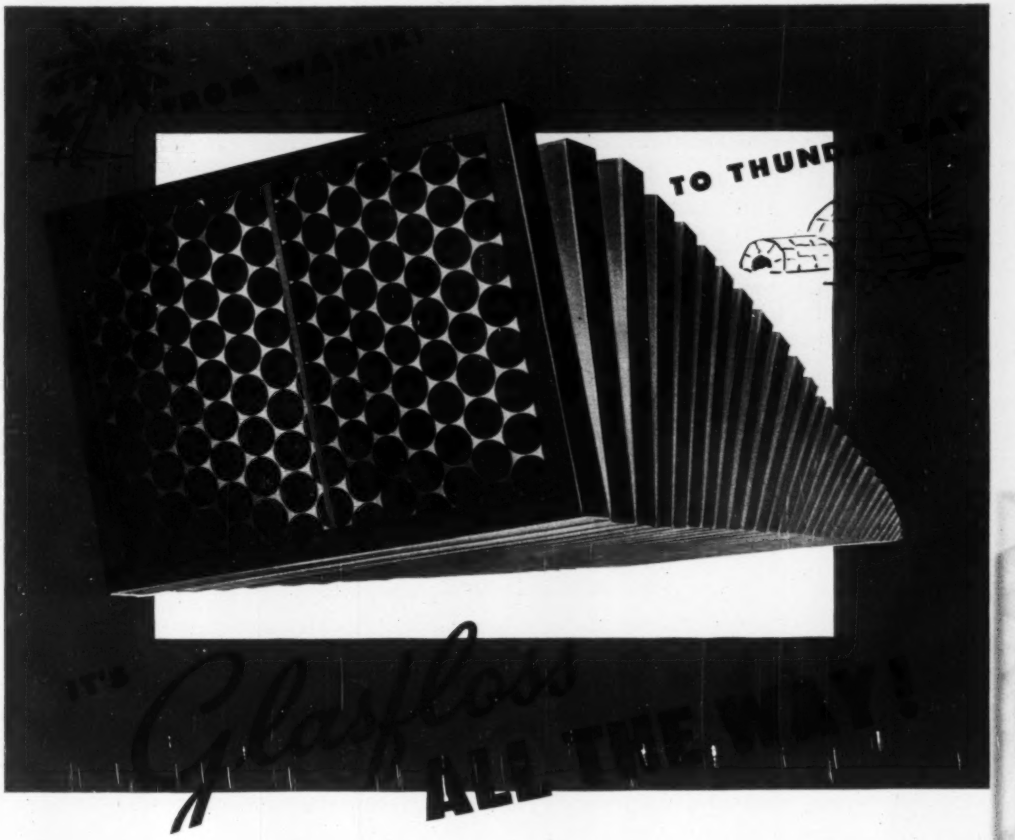
"Process control instruments orders for the first eight months of 1950 climbed from a postwar low in 1949 to a steadily increasing production which, in the third quarter, reached a new peak," it was reported by the SAMA executive committee. "During those three months, incoming orders exceeded by about 5 percent the highest comparable period during the peak war years in 1942," the committee reported.

DR. WALMER NAMED HYGIENE GROUP'S HEAD

Dr. C. Richard Walmer, medical director of the Industrial Hygiene Foundation, has been named managing director of the organization to succeed the late John F. McMahon. The foundation operates under the auspices of Mellon Institute.

Dr. Walmer, who has been medical director of the foundation and also a senior fellow of the institute since 1946, is a widely known specialist, is on the staff of three hospitals in the Pittsburgh district, and also conducts courses of lectures at the University of Pittsburgh's school of medicine and in its graduate school of public health.

MARCH OF DIMES
FIGHT
INFANTILE
PARALYSIS
JANUARY 15-31



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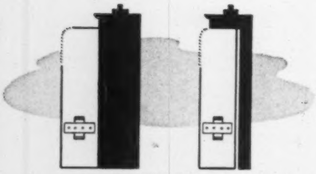

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"Open for Discussion"

• Do YOU HAVE something you'd like to say about any of the articles published this month? An additional comment, or perhaps a question on some point? Or do you want to express your views on some matter of interest to heating, piping and air conditioning engineers or contractors? We follow here the practice at engineering society meetings of providing an "open for discussion" period toward the end of the session. You are invited to participate. Address the Editor, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2.

BURNING WOOD WASTE AT MANUFACTURING PLANT

I WAS INTERESTED in the remarks on burning wood refuse at a manufacturing plant, on Sam Lewis' Page in the December HPAC.

In the Northwest, where saw milling and woodworking are major industries, every steam plant uses chiefly waste wood products. Some plants augment this with oil firing, and others have a surplus which is sold for domestic use or burned in refuse burners. Up to 1941, more than half of the homes in Portland were heated with sawdust or hogged fuel. Thus, combustion equipment has been provided here to burn wood refuse in installations ranging from the smallest warm air furnace to the largest steam power plant.

Naturally, the equipment to burn the wood waste properly varies over a considerably extended range, from small sawdust burners having a grate width of some 8 in. to dutch ovens and, now in a few cases, spreader stokers.

Since no information is available on the size or type of plant which was the basis of the discussion in the December issue, I feel hesitant to make any specific comments or any specific recommendations. The type of fuel has a very definite bearing, also. Some equipment might be suitable for sawdust and shavings but not hogged fuel, other equipment would be suitable for hogged fuel properly sized, and some other equipment, such as dutch ovens, would be suitable for any wood waste, including bark.

If there is more wood waste than is usable for the steam load, then either storage for periods when oil might be necessary or a separate type of incineration should probably be adopted.

In this area, there is virtually no provision for moving wood wastes with screw type conveyors, except very short variable pitch and variable diameter conveyors used locally for dutch oven feeds. This situation may be the result of experiences similar to those described by Mr. Lewis which have happened before my time. Conveyance is exclusively by air in so-called "blow pipe systems" from planers and other woodworking machinery and chain flight conveyors. Of course, when the waste is stored outdoors in large piles, then equipment such as clam shells and bulldozers is also employed.

Very generally, the equipment used falls in the following groups:

a) Up to boiler ratings of about 10,000 sq ft EDR, sawdust burners, available in a variety of sizes, consisting of sloping or step grate, and a storage hopper, into which the waste is shoveled by hand or delivered by open conveyor.

b) Installations generally above 10,000 sq ft EDR and water tube boilers, dutch ovens of rather standard design in which the fuel is burned in a pile. There are two installations in this area using spreader stokers.

Bulletin No. 15 of the engineering experiment station of Oregon State College, Rating and Care of Domestic Sawdust Burners, contains interesting information on the subject. —J. DONALD KROEKER, consulting engineer, Portland, Ore.

OXYGEN, ANESTHETIC GAS PIPING AT HOSPITAL

IN THE ARTICLE on the central oxygen and anesthetic gas piping in the new Columbus hospital addition in the December HPAC, it was stated that there is piping for oxygen, nitrous oxide, helium, carbon dioxide, air pressure, vacuum and a spare line. As installed, there are but six outlets, so there is no spare line. Also, the statement about the storage of bulk oxygen in the ball-shaped container should have read that it holds "50,000 cu ft of oxygen in a liquid state at 60 lb pressure."

The article mentioned that each floor has its own oxygen and anesthetic gas shutoff valves, but there is anesthetic gas only in surgery and OB. The section shutoff valves are accessible through panels from the corridors, rather than being installed in stainless steel cabinets in the corridors.

Copper was used for soil, waste and vent lines in sizes 2 in. and smaller.

As to sweating the joints, silver solder was used exclusively for all oxygen and anesthetic piping.

The addition has 260 beds, and there are 140 in the old building, making a total of 400 beds. The kitchen was designed to serve 1000 people, but not all of them have three meals a day at the hospital.

The oxygen and anesthetic gas piping was installed by Davis Construction Co.—S. T. NYLEN, Warner Construction Co., general contractors.

SOLVING THAT SHAMPOO PIPING PROBLEM

THE FOAMING shampoo problem perplexing "E. J. B." in the October HPAC has a number of interesting angles. Without a sketch of the waste piping involved and the type and method of venting the fixtures, it is necessary to do a little guessing.

Waste water does not flow straight down a vertical stack; the water travels on the wall of the pipe in a spiral pattern at high velocity. Because of this, it will not only foam at the basement elbow but will also foam all the way down the stack at each joint and particularly at the wye or tee connections of the floor drains and other fixtures and will be forced into the branch lines.

From this angle, it would appear that the problem can be solved at the floor drains. If the floor drains have no traps, they should be changed to deep seal traps with vents. If the drains have traps, it is hard to conceive how the foam would get through unless the traps have been allowed to dry out. Automatic primers or manual priming will solve this. Unvented traps will pass foam if back pressure builds up in the system. This condition is very common.

If none of the above solves the problem, floor drains with integral backwater valves are on the market which will definitely seal the line.

Plumbing codes and practices are so varied and so much "hay wire" plumbing is installed that almost any piping arrangement could exist in this and similar situations. Analysis of these systems usually means tracing out the piping from one end to the other.—Stuart Giles, associate mechanical engineer, Los Angeles City Board of Education.

WHY NOT STANDARDIZE SPECIFICATION SUBJECTS?

Referring to the comments on how to write specifications, on page 105 of the October HPAC, there are only a limited number of major and first subheadings in any specification and these are repeated, in some measure, on every job.

The trouble, as I see it, is that they are seldom repeated in the same sequence and the contractor has to learn a new "language" for every new set of specifications which come to him. Time is thereby wasted and the errors and duplication which result increase the cost of the job.

I cannot see that it is a "lazy scheme" (as it was called in the October article) to develop a standardized specification form, because the substance of the specification still has to be provided by the engineer himself. The order in which the major items of the specifications are included make for either uniformity and clarity or they provide confusion.

In a standard index to specification titles prepared by a joint committee of the Minnesota Society of Architects, AIA, and the Associated General Contractors of Minnesota, items are included for plumbing, heating, refrigeration, ventilating and air conditioning, sprinkler system, pneumatic tube system, and electrical work. This is fine insofar as it goes but the items would have to be materially extended to cover all necessary equipment.

Although I have adopted this sequence in my work, I fear that few others have or will. If, however, the major societies were to draw up a similar and more complete listing and publish it, I believe that it would be quite generally followed.

We are standardizing materials, processes, drafting procedures, and many other clarifying and timesaving schemes. Why not a sequence of major subjects in specifications? —Max R. Hughes, consulting mechanical engineer.

VERTICAL DISCHARGE UNITS INTRODUCED IN 1921

We wish to protest the publication of the article entitled Using Ceiling Heat With Unit Heaters, which appears on pages 98, 99 and 100 of the October HPAC, particularly the statement which starts the third paragraph, reading as follows: "Introduction of vertical discharge (projection type) unit heaters about 10 years ago was one important step toward solving the problem of waste heat in industrial and commercial buildings".

The present writer's company was the first to introduce the vertical downward discharge type unit heater, which equipment it has consistently advertised since 1921. The first lightweight suspended unit heater in any form in which such heaters have ever been sold was by this company in 1922.—H. S. Wheller, president & general manager, L. J. Wing Mfg. Co.

"QUOTE"

The United States faces a potential shortage of engineering graduates which poses a threat to international peace and to the economic progress and security of our country, according to Dr. William C. Knopf, Jr., assistant dean of the Technological Institute at Northwestern University.

Dr. Knopf, chairman of the Illinois-Indiana section of the American Society for Engineering Education, points out that although a large supply of engineers entered the job market upon graduation in June, recent reports have shown that virtually all of these graduates were absorbed quickly in industry as a result of the current demand.

"It is evident," he declares, "that there will be acute shortages of engineering personnel in the near future because of the increased need for engineers created by mobilization activities."

HANDLING ODOROUS FUMES FROM DRYING PROCESS

In answer to the odor problem due to exhaust from a process of drying cement in fastening automobile brake linings to the shoes, described by "G. C." in the September issue, several possibilities may be considered.

Additional ventilation may not be applicable because dilution of vapors of this type often enhances their odorous qualities. Physical adsorption is apt to be impractical because of the high temperatures involved.

A solution particularly adapted to removal of fairly concentrated odorous fumes at high temperatures is the use of a granular bed of solid catalyst which will promote the substantially complete oxidation of the organic material to inoffensive carbon dioxide and water. Granular beds of this type function satisfactorily in thicknesses of $\frac{3}{4}$ in. (accounting for a pressure drop of about 0.15 in. WG), and at linear flow rates through the bed of about 30 fpm.

Assuming a specific gravity of the granular material of about 0.6, this would correspond to about 15 cfm of contaminated air handled per lb of catalyst. Suitable canister or other unit cell equipment for handling the granular material is needed.

The advantages of the method include the facts that the effectiveness of oxidation of the fumes is aided by higher concentrations, and that the catalyst, if it is not subject to poisoning, does not get used up in service.—Amos Turk, director of research and development, W. B. Connor Engineering Corp.

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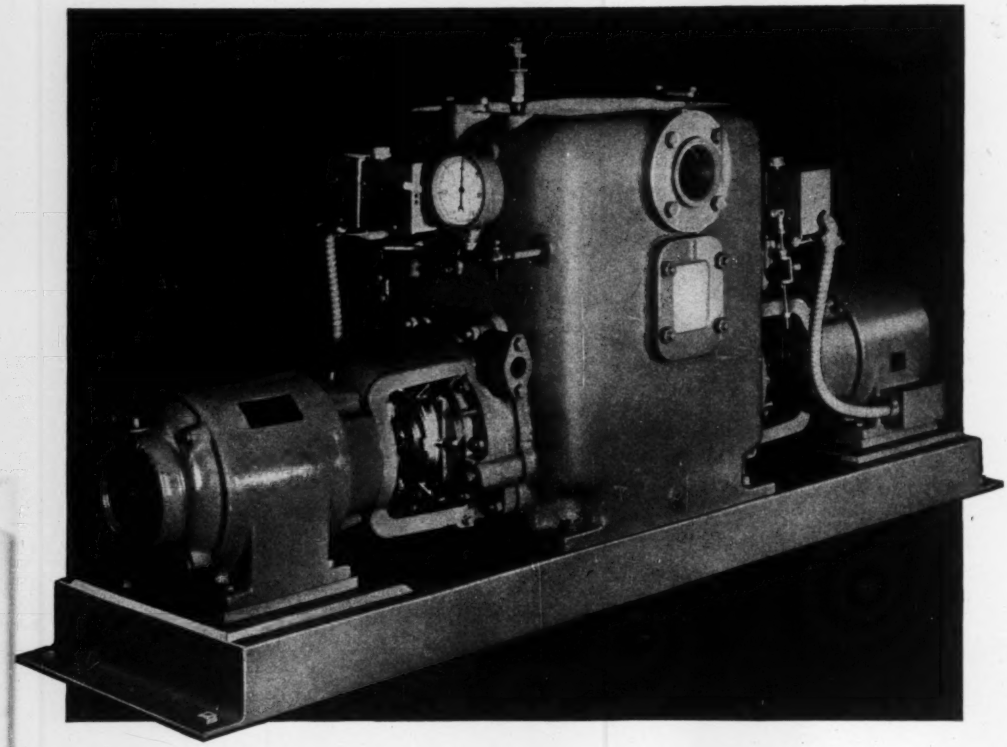

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THE NASH ENGINEERING COMPANY

New Laboratory Fume Hoods Cut Air Conditioning Load

By John F. Turner
Engineering Dept., Oak Ridge National Laboratory

Modern research laboratories demand air conditioning more and more, and where fume hoods of conventional design and accepted face velocities are used, enormous and varying quantities of conditioned air must be supplied to replace air drawn from the room. Recent fume hood developments make possible uniform and reduced room air quantities and thus simplify the air conditioning problem and provide a safer hood.

Modern research with its precise measurements requires controlled atmospheric conditions in order to utilize present day instruments to their fullest extent. Hygroscopic materials change weight and character, specific gravity of solutions changes and equipment gathers dust when the laboratory atmosphere is not conditioned. Some instruments, such as spectrometers and those using high potential, depend heavily upon constant temperature and humidity for accuracy of results. One type of spectrometer uses accurately shaped and expensive salt crystals which begin to dissolve when the relative humidity exceeds 50 percent. By conditioning the laboratory air, it is possible to eliminate these difficulties.

The air conditioning engineer starts to condition a typical office or sales room by determining the amount of sensible and latent load and the portion of outside air necessary for proper ventilation. Finally, a constant amount of room supply air of suitable wet and dry bulb temperature is chosen to absorb the load — an everyday application with no special problems.

The problem of conditioning a research laboratory, however, is much more difficult. Consider the economics of air conditioning a typical laboratory room 36 ft x 16 ft x 10 ft ceiling with one outside wall and exposed roof, containing four 8 ft fume hoods (7 ft x 2½ ft net face opening) making a total of 70 sq ft net hood face area.

Air Conditioning Load For a Laboratory

A typical office this size might have a cooling load of about 3 tons, but with a laboratory with the above mentioned fume hood facilities, the air conditioning load becomes quite different. If we assume in our design that the hood doors may be all open at the same time, which they well may be, it would be necessary to introduce 7000 cfm of conditioned air into the room based upon 100 ft face velocity, which is the minimum requirement for safe operation of conventional type hoods. This is equivalent to 73 room changes per hour, and since 200 cfm would normally be introduced any way for ventilation, 6800 cfm is really the net hood burden.

TABLE 1—AIR CONDITIONING LOAD for laboratory becomes prohibitive when supplying additional outside air to meet hood requirements

7000 cfm outside air required for hoods
200 cfm (two changes per hr) outside air normally supplied for ventilation

6800 cfm outside air, the net hood burden

Conditions Assumed:

Outside:	95 F dry bulb	75 F wet bulb	98 gr
Inside:	80 F dry bulb	50% rel. hum.	76 gr
	15 F difference		22 gr

Calculations:

6800 x 15 x 1.08 = 110,000 Btu per hr sensible heat
6800 x 22 x 0.67 = 100,000 Btu per hr latent heat

210,000 Btu per hr total

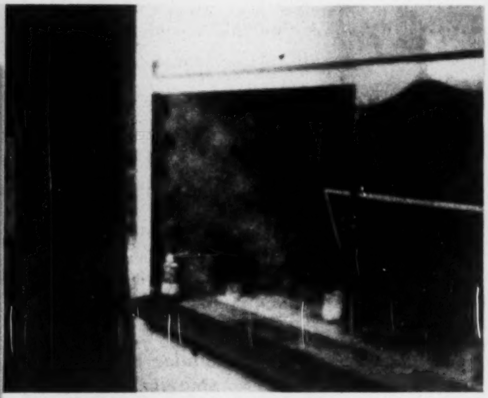
210,000/12,000 = 17 tons net hood burden
3 tons required for normal space occupancy (assumed)

20 tons total laboratory cooling load

To supply the room with this additional outside air to meet hood requirements might require an additional 17 tons or so of cooling capacity (Table 1) and a special type of

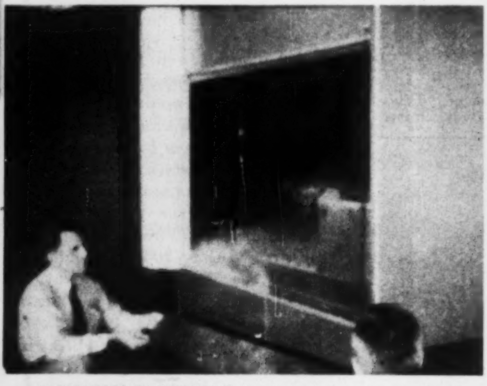
CONVENTIONAL HOOD with flat work surface and no spill retainer. Fumes creep forward from source 10 in. back. Slight disturbance in front of hood will draw fumes into room

Improved Fume Hood Design Cuts Air Velocity Required For Safety



WITH SIDE ENTRANCE shape of improved hood removed, fumes travel upward along hood end panel, remain close to front edge

HERE SIDE ENTRANCE shape is installed, and fumes no longer linger near front edge but go to back of the hood



WITHOUT DEFLECTOR in place, fumes creep to front edge of hood even at 100 fpm velocity

BOTTOM DEFLECTOR is raised to position, and the fumes move back, leaving "safety shelf" clean

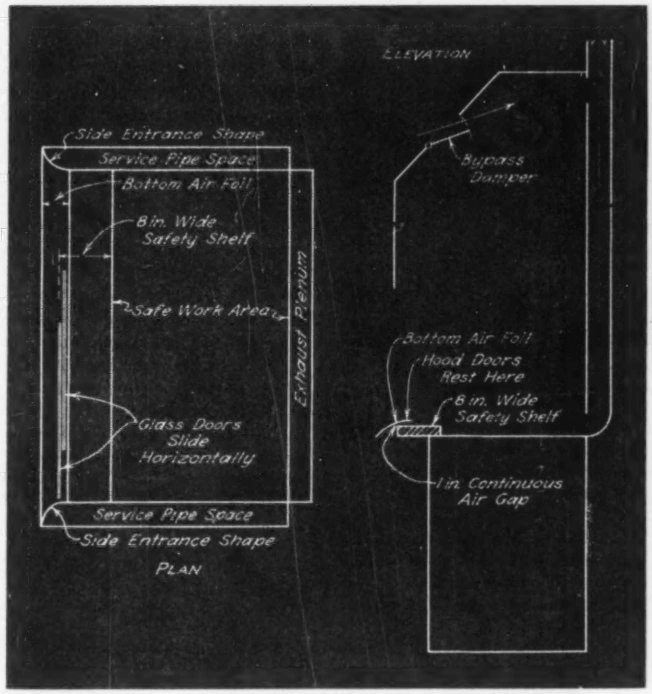


FIG. 1—CONSTANT ROOM EXHAUST and uniform face velocity for any fume hood door position are made possible by bypass damper. Sliding doors reduce air requirement by half and entrance shapes make possible a safe 50 fpm face velocity

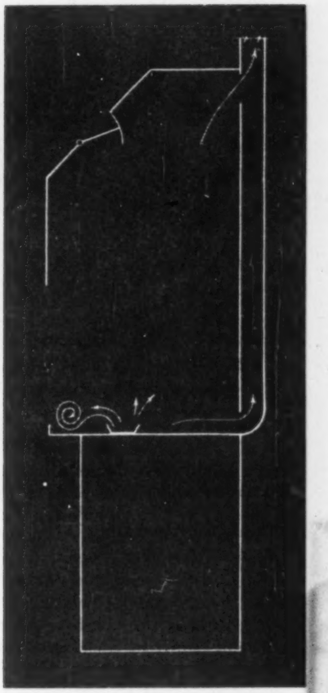


FIG. 2—FORWARD CREEP of fumes and eddy current at front edge of conventional hood are illustrated in this vertical section

air distribution — which make the cost of laboratory air conditioning prohibitive in some instances.

It is true that the conditioning load could be reduced by the application of a hood usage factor. Thus, it might be assumed that only 50 percent of the hood doors will be open at any one time. However, the experiments performed in the normal laboratory will differ from day to day and it is usually impossible to make any assumption as to how the various hoods will be used. Also, under-design may cause a decrease in room pressure which will result in cross contamination between rooms, lowered hood face velocities and possible leakage of noxious vapors from hood to room.

Attempts To Conserve Conditioned Air

Attempts have been made to conserve conditioned room air and establish a constant demand by the use of "pressurized" hoods which have a slotted plenum across the top and along the sides of the hood opening from which a "curtain" of unconditioned air is blown across the hood face. This "curtain" of air is drawn immediately into the hood by the hood exhaust fan and theoretically conserves conditioned room air. Thorough tests by the author have shown that the introduction of any appreciable "curtain" air causes vigorous turbulence inside the hood, resulting in frequent puff-backs in the operator's face; that the "curtain" air must be filtered; and that if the air is totally unconditioned, frequent fogging will result from the contact with cooler room air. This scheme thus has several disadvantages.

Recent Fume Hood Improvements

Recent fume hood improvements which facilitate laboratory air conditioning and make for a safe and usable hood comprise:

1) Constant rate of room exhaust and uniform hood face velocities for any door position by use of hood bypass dampers.
2) Reduction of hood face area open at any one time by replacing the conventional vertical sashes with horizontal sliding doors.
3) A safe 50 fpm laminar flow face velocity made possible by:
    a) Elimination of side entrance corners and center posts.
    b) Addition of contoured entrance shapes.
    c) Addition of "safety shelf".

The hood bypass dampers are listed first because, in theory, they solve the air conditioning design problem by stabilizing the room exhaust cfm and consequently the room supply. We say "in theory" because the location of bypass or relief dampers in the exhaust system and the method of operation determines their degree of effectiveness. Fig. 1 illustrates a hood cross section and shows one arrangement of bypass dampers. As the hood doors begin to close, the dampers start opening. In any hood door position, the exhaust air quantity and hood face velocity remain constant. As any chemist knows, a constant face velocity would prevent the disturbance of flames and light objects when the hood door is approaching the closed position. One of the most attractive features from

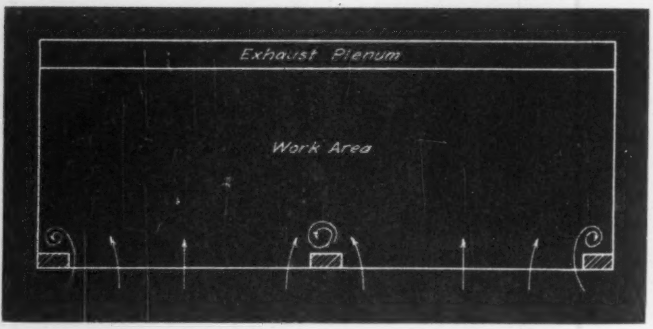


FIG. 3—EDDY CURRENTS behind center posts and at front corners of conventional fume hood are shown in this plan view

the chemist's view point about this type of bypass is the fact that the hood is continuously purged of fumes even while the hood doors are shut.

Methods for Operating Bypass Dampers

There are three methods for operating the bypass dampers which have been tried, but not all have been thoroughly tested in laboratory use.

1) By an electronic method with damper motors as described by Homer B. Clay in the July 1950 issue of Heating, Piping & Air Conditioning.
2) By an unbalance between external and internal hood pressures working on the familiar principle of the heating stove automatic draft check damper.
3) By mechanical linkages between hood doors and bypass dampers.

The reduction of the maximum hood face area which can be open at any one time is the simplest trick for conserving room air and not too great a compromise to accessibility on 8 ft hoods. Fig. 1 illustrates the sliding door arrangement whereby each half of the face area is covered by one of two glass panels which can slide past each other. If a laboratory can be equipped throughout with sliding door hoods, a foolproof 50 percent reduction of conditioned air supply can be made.

Extensive fume hood tests have shown that a uniform laminar flow of 50 fpm face velocity produces safer and more thorough fume removal than a 100 fpm velocity which is accompanied by turbulence and eddy currents inside the hood.

Figs. 2 and 3 show the behavior of fumes in a conventional type of hood and how they collect in eddy currents near the front to be drawn out into the room when a person walks past the front of the hood. These eddy currents form in a conventional type of hood regardless of face velocity and are the real menace to hood safety.

Fig. 1 illustrates the improved hood design after the front corners and center post have given way to side and bottom entrance shapes, making possible a safe 50 fpm face velocity.

The bottom entrance shape — consisting of the "safety shelf" and air foil — contributes the most to hood safety. The safety shelf, by the action of the air foil, remains entirely clear of fumes. It also defines an unsafe area back of which fuming sources may be placed with greatly increased security to the operator.

Cfm Requirement Cut To One-Fourth

Here, then, is a summary of accomplishments made possible by the use of fume hoods of improved design. The original 7000 cfm has now been cut to one-fourth (1750 cfm) by a 50 percent reduction of net hood face area and by reducing face velocities from 100 to 50 cfm. Consequently, the refrigeration load has been reduced from 20 tons to 7 tons — a 65 percent reduction (Table 2).

In addition to reducing the refrigeration requirement by 65 percent and stabilizing the air requirement, the problem of draft-free air distribution has been simplified by reducing the total room air changes from 73 to 18 per hour. Most important of all, the chemist is provided with a safer and more usable fume hood.

Hoods which incorporate the above described features are gaining favor as general purpose hoods at the Oak Ridge National Laboratory.

[The work covered in this article was performed at the Oak Ridge National Laboratory under contract No. W-7405-eng-26 for the Atomic Energy Commission. It included a 16 mm film, Study of Entrance Air Conditions in Hoods, produced as a result of studies by W. G. Stockdale, chemical technology div., and John F. Turner, engineering dept.]

NET EARNINGS GAIN 32 PERCENT

IMPROVED MANUFACTURING methods and newly designed products largely account for the 32 percent gain in net earnings of York Corp., air conditioning and refrigeration pioneer, it was announced last month upon issuance of the company's annual statement for the year ending September 30, 1950. The company also reported a 13 percent increase in orders booked.

Completed sales for the year amounted to $49,088,198.

President Stewart E. Lauer told stockholders that the largest increase in orders booked was for air conditioning products and installations.

TABLE 2—IMPROVED HOOD design enables cutting air requirement to one-fourth and a two-thirds reduction in refrigeration load

7000 cfm / 4 = 1750 cfm air requirement with improved type of hoods

1750 cfm
200 cfm (two room changes per hr) outside air normally required for ventilation

1550 cfm outside air, reduced net hood burden

1550 x 15 deg diff x 1.08 = 25,100 Btu per hr sensible heat
1550 x 22 gr x 0.67 = 22,900 Btu per hr latent heat

48,000 Btu per hr total

48,000 / 12,000 = 4 tons reduced net hood burden
3 tons required for normal space occupancy

7 tons reduced total laboratory cooling load

Let's Take a Look at

THE FUEL SITUATION

Kalman Steiner, of C. Hoffberger Co., Baltimore (coal, fuel oil and burners, and ice), and a member of HPAC's board of consulting and contributing editors, has written widely on fuels and fuel burners from a background of much practical experience and careful study. In this article, he furnishes information to help answer the question: During a period of intensified military preparation, will the American fuel industry be able to supply all demands for fuel?

During a period of intensified military preparation, will the American fuel industry be able to supply all demands for fuels to run our commerce and industry, heat our buildings, and maintain the military? Memories of fuel shortages during World War II are still vivid. Will there be a repetition of these conditions—with regard to all fuels, or with respect to any one fuel?

These questions confront plants and buildings today. This article will review the general fuel picture—fuel production and consumption, fuel efficiency, trends in fuel utilization, new developments in fuel technology, changes in fuel policies. The author hopes to show that, in general, there will be an adequate supply of all fuels in the foreseeable future, despite effects of military preparations, but that marked tendencies are apparent that may alter the character of our fuel industry and fuel utilization.

Coal the Basis of Our Industrial Expansion

During the greater part of its economic history, this nation derived most of its energy supply from solid fuels. Coal has been the basis of our tremendous industrial expansion and our rise as a world power. Coal continues to serve as an important — in fact, vital — fuel for many purposes, and as an indispensable commodity in some essential processes.

For power generation, utility companies burned 80.7 million tons of soft coal (bituminous and lignite), and 3.2 million tons of anthracite, during 1949 (Bureau of Mines preliminary figures). It should be noted that in 1949 the average consumption of coal per kwhr produced was 1.25 lb, as compared to 3.2 lb in 1919 — a noteworthy gain in efficiency in 30 years. The railroads in 1949 used about 68.1 million tons of soft coal. In the same year, 91.4 million tons of bituminous coal was converted to coke. The fourth largest classification of consumption is the retail dealer, who disposed of 90.3 million tons of soft coal. Total production figures for 1949 show 435 million tons of soft coal (compared to 599 million tons for 1948), and 43 million tons of anthracite (compared to 57 million tons in 1948).

According to the American Institute of Mining and Metallurgical Engineers, the potential output of American soft coal mines is 667 million tons per year. In 1947 the all-time annual peak production was attained — 630.6 million tons. Two factors militate to hold production below the potential — demand for coal and work stoppages. As to the latter, there were 421 strikes in soft coal mines in 1949, with 1,130,000 workers involved and 16,700,000 man-hours lost. As to demand, the changing trends with fuels will be brought out below.

For the first nine months of 1950, soft-coal production was 362.6 million tons, or about 5 percent ahead of 1949; anthracite production for 1950 through November 18 totalled 36.7 million tons, or a 2.8 percent increase. Obviously, there should be no shortage in coal supply because of any abnormal increase in demand. Should the demand increase, the coal can be produced. Whether it will be brought above ground depends upon the occurrence of strikes; whether it will be moved to market depends upon availability of transportation.

Since no significant method of reducing iron ore other than the blast furnace has yet been developed, it can be expected that a sharp increase in demand for steel will be accompanied by an increase in coking operations. Most coke is now made in byproduct ovens. Peculiarly, important byproducts of coking are benzene and toluene, starting points for the manufacture of explosives. By this technological coincidence, as the demand for armament steel increases, the supply of benzene and toluene increases by virtue of stepped up coke manufactured in byproduct ovens.

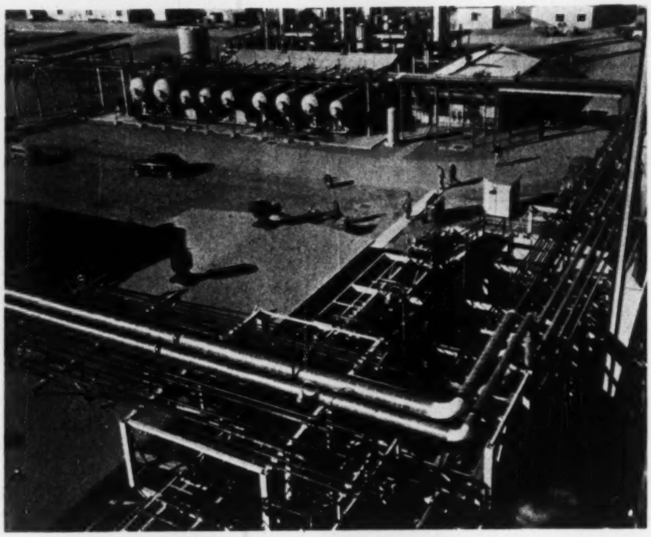
Coal consumers measure available inventories in terms of days' supply on hand. At the end of October 1950, the principal classifications of stocks, in days' supply, were: electric power utilities, 101; coke ovens, 57; steel and rolling mills, 50; cement mills, 56; other industrials, 69; railroads, 24; and retail dealers, 14.

Petroleum Production In High Gear

With the outbreak of the trouble in Korea last summer, the petroleum industry rapidly threw production into high gear. The overall activities of the petroleum industry are complex, involving such diverse factors as crude production and stocks on hand; refining rate and stocks of finished products; imports and exports of crude and finished product; well completions and rate of exploration; known reserves and additions thereto, etc. Perhaps the quickest, simplest and most accurate picture can be drawn from that set of data recorded, in the extensive statistics of the petroleum industry, as "runs to stills," meaning the quantity of crude oil pumped daily into the refining stills, to be converted into finished product. During the war years, the daily average runs to stills increased from 3.86 million bbl in 1941 to 4.71 million bbl in 1945. The increase continued until 1948, the rate for that year reaching 5.6 million bbl, then dropped off slightly in 1949 to 5.33 million. For 1950, the Bureau of Mines forecasts an average of 5.7 million bbl per day. (1 bbl = 42 gal.)

To make available this increasing flow of crude oil to stills, we have had to increase our imports. Crude production in this country during 1950 will be slightly under that for 1948, according to the Bureau of Mines, while demand will be about 10 percent higher. The difference will be met by imports. We are also importing significant quantities of finished product, particularly fuel oil.

Readers of HPAC are particularly concerned with fuel oil rather than with the entire petroleum refinery output, which includes, of course, motor fuels, lubricating oils, solvents, etc. Narrowing the focus of our inquiry, we note that petroleum records classify fuel oils into three grades; kerosene, distillates and residuals. Again going back to the war years, each grade showed an increase from 1941 to 1945; kerosene from 0.2 to 0.22, distillates from 0.52 to 0.68, and residuals from 0.94 to 1.29, all in millions of barrels daily average. In the same order, the 1948 peaks were 0.33, 1.04 and 1.31 annual daily average, and the 1949 figures somewhat less: 0.28, 0.93 and 1.16. It will be noted that the rates of production for kerosene and distillates were still higher than at the end of the war, but that residuals were off a trifle.



40 MILES OF PIPING, some of it shown here, is needed at the Bureau of Mines coal hydrogenation demonstration plant at Louisiana, Mo.

The explanation lies in the shift of the railroads from oil burning steam locomotives and coal burning steam locomotives to diesels. Railroad locomotives use residuals in oil burners, but distillates in diesels. In 1941, less than 1 percent of the freight and 8 percent of the passenger service was handled by diesels; in 1949 the respective figures were 35 and 49 percent.

In addressing the oil industry assembled in Baltimore on October 16, 1950, in celebration of "Oil Progress Week", Stanley C. Hope, president of the Esso Standard Oil Co., brought out the following salient points regarding the ability of the oil industry to meet a national crisis. Its productive capacity has been increased 27 percent since the peak war year of 1945; proved resources of crude are up 24 percent since the close of World War II; refining capacity is up 24 percent, and pipe line capacity has increased 14 percent in the past five years. He summarized: "Save for a few special products such as aviation gasoline, a considerable increase in military oil requirements should be met by the industry with little effect on its ability to supply civilian requirements."

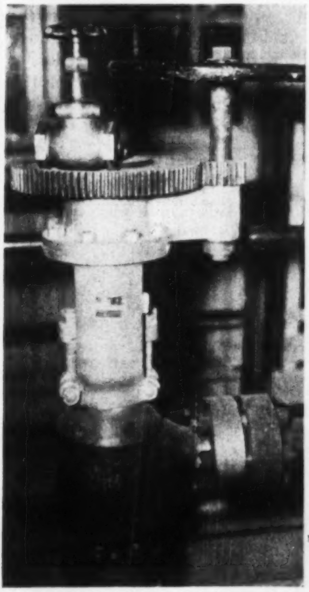
We turn now to the third natural-resource fuel — natural gas. (It is not necessary here to consider manufactured gas, since the oil and coal used to make it are reflected in the figures shown above for solid and liquid fuels). Natural gas has shown a consistently rising rate of consumption, from 2.89 trillion cu ft in 1941 to 5.27 trillion in 1949.

Natural Gas Consumption Rises Consistently

Unlike either coal or oil, natural gas did not show a drop from 1948 to 1949. With continuing extension of pipe lines into new territories, the industry takes on new customers each year. However, approximately 75 percent of all marketed natural gas was used by industrial consumers, with an average value (1948) at point of consumption of 12.5c per thousand cu ft. The remaining 25 percent was used by domestic and commercial consumers at an average value (1948) at point of consumption of 59.6c per thousand cu ft. Furthermore, over 80 percent of all production was used in 11 gas-producing states, and 53 percent in the three largest producing states (Texas, California and Louisiana). About 10 percent of the total natural gas output is not used as a fuel, but is the raw material for carbon black manufacture.

In 1949, coal furnished 39.3 percent of the country's annual energy supply, petroleum 36.4 percent, natural gas 19.4 percent and water power 4.9 percent.

The shift by railroads away from steam toward diesel propulsion has already been noted, resulting in a reduction in consumption of residual fuel oils and coal and an increase in demand for distillate fuel oil. Another change in fuel type results from the development of the jet propelled airplane engine. The latter burns kerosene, instead of high test aviation gasoline as required by an airplane type internal combustion engine. Another interesting development is the application of liquefied petroleum gas (LPG), consisting of byproduct gas from gasoline refining, to motor fuel for trucks and buses. It will be seen, therefore, that changing fuel technology tends to ease demand for gasoline at one end of the petroleum product list and for residual oils at the other end, and to increase demand for distillates in the middle. In its recent investigation of the fuel supply situation for New England during this current winter, the Senate small business fuels subcommittee, (Senator William Benton, chairman), while finding the picture "for the most part satisfactory," suggested that refiners' yields of heating oils be increased. "As a step toward this objective," continued the report, "one of the major primary suppliers of heating oils and kerosene to the East Coast announced on October 14 an immediate increase of 1/2c a gallon on these fuels at eastern seaboard points, and simultaneously reduced the wholesale price of gasoline in the Gulf Coast area. The effect of these price adjustments is to encourage refineries to increase their yield of the heating fuels and to lower the yield of gasoline."



SIZE AND WEIGHT of equipment for coal hydrogenation to withstand the high pressures and temperatures is shown by this comparison of a 2½ in. standard valve and a 2½ in. 700 atmosphere valve

Brief Look At Our Fuel Reserves

Before leaving the realm of conventional fuels and taking up consideration of the newest phase of American fuel technology, synthetic fuel manufacture, let's take a brief look at American fuel reserves. Recoverable coal deposits represent enormous reserves — at present rates of consumption representing almost 2000 years' supply. However, most of this coal is high volatile bituminous and lignite; the better grades of low volatile coal, particularly good coking coals, are being consumed rapidly. Hence, it is quite understandable that technologists are seeking ways to convert the bulk of our fuel reserves (the lower grades of coal) into more useful forms of fuel.

As to petroleum, it is always difficult to formulate an accurate conception of reserves, for the reason that geologists constantly confirm additional areas as probable oil bearing districts. However, petroleum reserves are measured in decades of supply rather than centuries. Natural gas reserves resemble oil reserves, both as to extent and rate of discovery of new supply.

Synthetic Fuels of Real Significance

Some years ago, under the Synthetic Liquid Fuels Act of April 5, 1944, the United States embarked upon extensive research into means and methods for converting lower grade fuels into more valuable forms.

The synthetic fuels program has attained proportions of real significance. In the 1949 annual report to Congress on synthetic liquid fuels, the Secretary of the Interior points out that about half of our current energy needs are supplied from oil and natural gas, with the increase each year being supplied from these rather than from solid fuels. In 1948, the energy provided by coal was substantially the same as in 1920, but meanwhile the use of oil and natural gas had increased fivefold. Coal consumption has dropped from 6 tons per capita to 4.5, while oil increased from 4-1/3 bbl to 14-1/3 and natural gas from 7500 cu ft to about 35,000 cu ft per person, annually. With 95 percent of our fuel reserves represented by solid fuels, it is but logical that means be sought to supply the increasing demand for liquid and gaseous fuels by conversion of solid fuels to other forms. In addition, we have one other fuel resource in the form of oil shale, from which liquid fuels can be made.

Two methods have been developed for producing liquid fuels from coal — by direct hydrogenation, and by first gasifying the coal followed by synthesis of gas into a liquid, the latter being known as the Fischer-Tropsch process. The Bureau of Mines has demonstration scale plants for carrying on both methods at Louisiana, Mo., about 100 miles above St. Louis on the Mississippi River.

In direct hydrogenation coal is crushed, dried and pulverized and then made into a paste by mixing with a heavy oil, into the mix there being incorporated a small quantity of catalytic material such as iron oxide or a compound of tin. This heavy, viscous paste is injected by steam driven reciprocating pumps into a tubular preheater where hydrogen is added. The paste becomes a free flowing liquid as it reaches high temperatures. The liquid enters huge liquid phase converters enclosed in reinforced concrete protective stalls — a converter being a massive forged steel cylinder weighing about 100 tons. In the converter the hydrogen reacts with the coal to form oil and gasoline. The products of this first conversion are separated, the finished product being taken to storage and unfinished or uncombined material being recharged into a second converter with additional hydrogen. Additional processing finally converts the coal into liquid or gaseous hydrocarbons. The reactions are conducted under pressures up to 10,000 psi. Hydrogen for the process is obtained by cracking natural gas with steam or reacting pulverized coal with steam.

Coal hydrogenation is a versatile process, in that a wide range of solid fuels can be used as raw material — from high grade bituminous to lignite — and the end products can be varied by controlling the process so as to make, separately or simultaneously, liquids ranging from No. 6 fuel oil up to aviation gasoline. Important byproducts also are obtained: phenols for plastic manufacture, creosote for wood preservation, solvents for paint, benzene for explosives and dystuffs, and hydrocarbon gases for liquefaction.

The Fischer-Tropsch process differs radically from coal hydrogenation. For this process, the coal is first gasified to carbon monoxide and hydrogen (or natural gas may be the starting point). Gasification is accomplished by the use of oxygen and steam, somewhat as in the old water gas process. But whereas the latter uses air as the source of oxygen, synthesis gas is made by the use of oxygen in order to eliminate nitrogen from the system. The oxygen comes from a liquefication plant that boils off the oxygen from liquid air, at a temperature of −300 F. The synthesis gas itself must be thoroughly cleaned, as only minute traces of foreign matter can be tolerated in the reaction. The synthesis or conversion, accomplished in the presence of a catalyst, is carried on in a converter under pressures of 300 to 600 psi and at a temperature up to 600 F.

The yield from Fischer-Tropsch synthesis is primarily motor gasoline and diesel fuel oil, with methyl and ethyl alcohol as lesser byproducts, while the direct hydrogenation gives aviation grade gasoline, and important byproducts as already described.

Oil shale is the term used to designate a rock that bears organic matter which upon heating yields an oil resembling petroleum, and capable of being refined by similar methods. Vast deposits of oil shale exist in this country, principally in Kentucky, Indiana, Colorado and Utah, but elsewhere also. The production of oil from shale involves mining and retorting of the rock, followed by refining of the crude shale oil into finished product. The Bureau of Mines has constructed, at Rifle, Colo., an oil shale demonstration plant which has been mining, retorting and refining on a commercial scale basis.

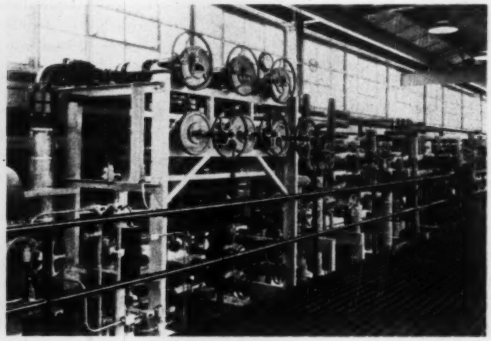
Modern Mining and Handling Methods

The most modern methods of mining and materials handling have been incorporated into these operations. By these means mining output is at the rate of 150 tons of rock per man day underground (as compared to about 10 tons per man day in coal mining). For retorting, after much experimental work, excellent forms of apparatus are emerging, constituting methods for continuous handling of crushed shale from which the oil is distilled. The shale oil is then refined by processing in stills. While methods strictly analogous to petroleum refining can be applied to shale oil, it appears that the special nature and properties of shale oil call for somewhat different methods in order to produce best results. Hydrogenation can be effectively utilized in this work. By varying the process, refining of shale oil can yield an assortment of finished products from 90 octane gasoline, through diesel and jet engine fuel, to bunker C fuel oil.

The methods of synthetic liquid fuel production described above have by now been developed to the point that differences in cost between these synthetics and conventional liquid fuels are rapidly vanishing. Other studies being made by the Bureau of Mines toward supplementing our fuel resources include manufacture of alcohol from agricultural residues (such as corn cobs and the hulls of cottonseed, oats and rice), and investigations of methods for secondary recovery of crude oil from wells. Research is also being conducted on the underground gasification of coal for the dual purpose of producing synthesis gas and of generating electric power as underground gasification offers a means of utilizing thin and impure seams that cannot be economically mined.

[The author wishes to acknowledge with thanks the assistance of W. C. Schroeder, chief, synthetic liquid fuels branch, Bureau of Mines, U. S. Department of the Interior, in the preparation and review of this article. Photos courtesy of Bureau of Mines.]

MODERN EQUIPMENT—such as this electric shovel loading a 15 ton diesel truck used underground at oil shale demonstration mine near Rifle, Colo.—keeps mining costs low



HEAVY CONSTRUCTION of pipes and valves on second floor of pump house at Bureau of Mines hydrogenation demonstration plant posed new manufacturing problems

How Industrial Piping Is Welded

The welding processes used in fabricating industrial piping systems are clearly explained in this authoritative review

THE WELDING processes most commonly used in piping installations are the manual oxyacetylene process and the manual shielded metal arc process. Other processes, among which are automatic and semiautomatic submerged arc, inert gas metal arc and atomic hydrogen welding are used to varying extents, particularly in established shops. The fundamentals of all of these processes, together with the rules governing their qualification and the qualification of welders, are treated in detail in the AWS Welding Handbook. The following discussion deals with the application of the various welding processes to piping installations and bears directly on workmanship.

Manual Shielded Arc Process

Manual shielded metal arc welding may be used for nearly all ferrous and nonferrous metals used in piping systems. The equipment required for its application is comparatively simple and compact, readily portable, safe to use, and, with ordinary care, requires little maintenance. Electric power supply for the operation of either d-c or a-c machines is readily provided in the permanent shop, and in many cases is available for field work. If electric power is not available the use of gasoline or diesel engine driven welding machines will give satisfactory service.

The number of passes required for welding joints in ferrous piping varies with the wall thickness of the pipe, the welding position of the pipe, the size of electrode used and the welding currents employed. In welding low carbon and low alloy steel pipe in the rolled or horizontal position, under generally accepted procedures, the number of passes is approximately one per 1/8 in. of pipe thickness. The electrodes used in these procedures vary from 1/8 to 5/32 in. diameter for the first pass; 5/32 in. diameter for intermediate passes; and 3/16 or 1/4 in. diameter for the top passes and reinforcement.

In welding medium carbon and higher alloy steels in the rolled or horizontal position, the number of layers is usually increased 25 to 30 percent and smaller electrodes are used to lessen the heat concentration and to insure complete grain refinement of the weld metal.

With the pipe in a vertical fixed position, deposition as described above is not possible, and instead the metal is deposited in the form of a series of overlapping string beads, the number of which, when using 5/32 in. maximum diameter electrodes, may be approximated roughly by allowing 25 to 30 beads per sq in. of weld area.

The number of passes for welding joints in nonferrous piping will vary to a considerable extent because of the wide differences in fusion temperatures and heat conductivities of the metals, factors which have considerable bearing on the welding technique employed.

It is common practice to do as much welding as possible in the flat or downhand position, using suitable power driven apparatus for continuously rotating the work at a speed consistent with the rate at which the filler metal can be properly deposited. This assures uniformity both in depositing the filler metal, and in distribution of heat, thus lessening distortion. The extent to which flat position welding can be applied is limited by the dimensions, shape and weight of the component parts to be welded, the facilities for rotating the work, the amount of handling involved, and the heat treating requirements.

Fixed position welding requires special care in depositing successive beads or layers, as called for by the procedure, uniformly around the joint in order to avoid excessive stress concentrations or distortion due to uneven heat distribution. The assembly or piping system should be positioned so that the joints are readily accessible to the welder from all points; and when preheating or stress relieving is to be done, there should be ample space for applying and removing the heating apparatus.

There is no universally accepted or recommended direction of welding on pipe in the horizontal fixed position. In metal arc welding, the preferred direction seems, usually, to be from the bottom upward. However, considerable welding, especially of thin or medium thickness pipe, is done in the opposite direction. Ordinarily, more metal per layer is deposited when welding upward, and the requirement that the layers be thin enough to undergo complete grain refinement must be observed. On the other hand, welding downward probably requires a higher degree of manual skill to secure adequate fusion with the side walls and to avoid trapping of slag.

Each layer of deposited weld metal should be thoroughly cleaned prior to the deposition of the following layer. Wire brushing, especially when done with a power driven brush, is effective in removing the slag deposited by covered electrodes used in arc welding. Surface defects which would otherwise affect the soundness of the weld should be

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The chapter on industrial piping of the new third edition of the American Welding Society's Welding Handbook—from which this material has been taken by special permission—was prepared by a committee consisting of D. H. Corey, The Detroit Edison Co., chairman; A. N. Kugler, Air Reduction Sales Co.; J. D. Mattimore, Tube Turns, Inc.; J. Hall Taylor, Taylor Forge & Pipe Works; H. Weisberg, Public Service Electric and Gas Co.; and C. C. Zimmerman, Benjamin F. Shaw Co.

chipped out. The surface of the deposited metal and the faces of the base metal should be prepared for the following layer by removing bumps and sharp corners or grooves which might otherwise be difficult to fill without risk of slag inclusions. In welding for severe service conditions, such cleaning is often done with power operated chipping tools. See chapter 10 of the Welding Handbook for further information on the fundamentals of shielded metal arc welding.

Manual Oxyacetylene Welding

Manual oxyacetylene welding is used for many of the ferrous and nonferrous metals used in piping systems, although its use generally is confined to small sized piping, or to work where the clearances around the joints are small. However, the process offers the same advantages of flexibility, simplicity, safety and low maintenance costs as manual shielded metal arc welding. In addition, the equipment required for its application is less expensive and more portable than that required for the shielded metal arc process. Consequently, it provides an inexpensive means for welding of piping systems in instances where the lack of electric power facilities or the cost of electric welding equipment precludes the use of arc welding.

As in the case of manual shielded metal arc welding, oxyacetylene welding techniques may differ in some details but the fundamentals relating to joint design, number of passes, direction of welding and cleaning are the same. The number of passes required for welding joints in ferrous piping varies with the wall thickness of the pipe, the position of the pipe when welded and the size of the welding rod used.

While the methods of depositing weld metal for the various positions are similar to those employed in manual shielded metal arc welding, the thickness of the deposited layers is usually greater. For joints in low carbon or low alloy steel piping that can be rolled, or when the work is in a horizontal position, using the backhand technique, one pass is usually used for wall thicknesses up to $\frac{3}{8}$ in., two for wall thicknesses $\frac{3}{8}$ to $\frac{5}{8}$ in., three for wall thicknesses $\frac{5}{8}$ to $\frac{7}{8}$ in., and four for wall thicknesses $\frac{7}{8}$ to $1\frac{1}{8}$ in. Using the forehand technique, the weld is usually deposited in a single pass. With the pipe in the vertical fixed position, the number of passes varies widely. However, for most applications, determination of the number of passes by the rule of one pass for each $\frac{1}{8}$ in. thickness of pipe wall is considered good practice.

The number of passes used in welding medium carbon and high alloy steels and nonferrous metals varies to a considerable extent because of the diversified effects that the heating and cooling cycles have on the metallurgical structures of the metals.

With regard to direction of welding, the backhand technique in oxyacetylene welding usually contemplates starting at the top of the pipe and finishing at the bottom, whereas the forehand technique contemplates starting at the bottom of the pipe and working upward to the top. See chapter 5 of the Welding Handbook for further information on the fundamentals of this process.

Submerged Arc Use Increasing

The use of automatic and semiautomatic *submerged arc welding* for piping is rapidly increasing. This process is generally applicable to longitudinal seam welding of rolled plate piping, circumferential welds on piping 8 in. in diameter and larger, and straight fillet welds of fabricated plate specials. In addition, semi-automatic submerged arc welding is also being used to some extent in welding intersection joints. Rather extensive shop facilities are required for this process, including 600 to 1200 amp generators or a-c transformers, work positioners and, for the fully automatic method, structures for supporting and positioning the welding head. Backing rings are generally used for groove welds, or, as an alternative, the root pass of the weld may be made manually. Accurate preparation, and good fit-up of the joints are essentials since the process allows little, if any flexibility to compensate for irregularities on this score.

Submerged arc welding has been applied to a wide variety of steels, including low carbon and medium carbon steels, and some of the low, medium and high alloy steels with special properties of heat resistance, corrosion resistance and high strength. See chapter 13 of the Welding Handbook for further information on the fundamentals of this process.

Atomic hydrogen welding is occasionally used for the joining of light gage carbon steel, alloy steel and nonferrous metals including aluminum, nickel and copper and their alloys. Special equipment is required for its application, and to obtain the advantages of its adaptability for welding complex sections, such as jacketed piping constructed of dissimilar metals, considerable skill is required on the part of the welder. See chapter 11 of the Welding Handbook for further information on the fundamentals of this process.

Inert Gas Arc Welding

Inert gas metal arc welding was developed early during the last war and has become a dependable method for welding piping materials that are difficult to weld by other processes, particularly aluminum, magnesium and high chromium-nickel alloys. It has been used to a limited extent for welding copper. For practical reasons the thinnest section that can be hand-welded is approximately 1/32 in. The maximum thickness that may be welded is limited by available equipment and will vary for different metals.

As with other processes, accurate preparation and good fit-up are important considerations. Depending on the metal welded, the cleaning operations preparatory to welding should be carefully performed, and in some cases may require the use of chemical treatments, especially on aluminum and magnesium because of their tendency to oxidize readily. Some type of backing is beneficial, but, depending again on the metal welded, care should be exercised in the selection of such material from the standpoint of its effect on the welding.

In general welding procedures follow the same general principles common to other processes, and equivalent welder skill is essential for satisfactory results. For further information on the fundamentals of inert gas metal arc welding see chapter 12 of the Welding Handbook.

Pipe Conveyor Wins Battle Against Abrasion

Withstands Action of Sand, Silica, Other Glass Furnace Charges at High Velocities

SAND, SILICA AND other abrasive ingredients of glass furnace charges are destructive to most conveyor materials even when moving at slow speed. But the service becomes many times rougher when speeds up to an estimated 100 mph are involved.

Yet these conditions were faced by the McKee Glass Co., Jeannette, Pa., when it introduced into its production line what is believed to be the only pneumatic pressure conveyor system for handling furnace charges in the glass industry. The company makes molded glass articles for industrial and household purposes. Raw materials used include silica, sand, feldspar, fluorspar and borax, which are transferred from hopper cars to storage by means of three overhead vacuum pipe lines, each 115 ft long with an inside diameter of 5 and 6 in. and a wall thickness of ⅝ in. It is in these pipes that the raw materials reach the estimated speed of 100 mph.

The materials are routed to a mixer where broken scrap glass is added.

From the mixers, an overhead main pressure conveyor 780 ft long carries the mixed charge, to which broken glass scrap has been added, to the furnaces at an estimated speed of 60 mph.

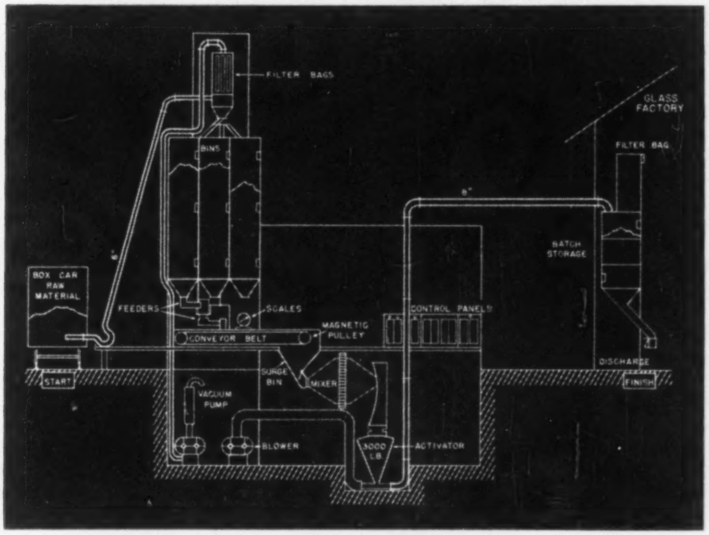
Originally, the lines used standard pipe and fittings, which wore out in a short time. In addition to high cost of frequent replacement, contamination caused discoloration of the glass.

The first corrective tried out was to adopt lined pipe which withstood abrasion better but did not have long enough life to warrant the cost.

Tests indicated a much longer life for nickel-chromium white iron, and it was decided to try out this alloy for the elbows, which are subjected to the worst wear. These elbows were found to have many times the wear resistance of the ones they replaced. Now the entire conveyor system has been equipped with the alloy.

Since the adoption of the alloy for this service, contamination has been further reduced by the introduction of pulleys using permanent magnets made of aluminum-cobalt-iron alloy. These pulleys remove tramp iron particles.

[Illustration courtesy The International Nickel Co., Inc.]



FLOW CHART of the vacuum conveyor and pressure delivery system for handling broken glass, silica, sand and other abrasive materials used in the manufacture of molded glass articles for industrial and household uses

Universal Joints Needed in Extension Stems for Valves

When extension stems are used to operate inaccessible valves, it is frequently important to provide for changes in valve position due to movement of the piping, says George W. Hauck, manager of engineering sales, Crane Co. This may be done by means of universal joints and a spline coupling or connection in the extension stem, as employed in the examples given here

FOR THOSE VALVES which are below an operating floor or otherwise subnormal in elevation, the use of floor stands and extension stems is recommended to promote efficiency and reduce piping operating costs. Floor stands and extension stems are excellent accessories for valves at lower levels and serve a most useful purpose. However, in some cases, it is important that a very necessary precaution be observed.

The base of a floor stand must be bolted to the floor — or to a runway, platform, etc. — and hence it is anchored. It is then connected through an extension stem to a valve. This hookup will operate effectively provided the valve remains in its original fixed position. If the valve changes its location, even moderately, due to movement of the piping, then manipulation of the valve through the extension stem will be affected adversely. Figs. 1 and 2 illustrate what happens.

What Happens When Valve Position Changes

Fig. 1 shows a floor stand mounted directly above a valve; the floor stand, extension stem and valve have a common vertical center line. If this relationship of the three components is maintained, no difficulties will ensue. In such cases, the extension stem can be connected directly between the valve and the floor stand.

Fig. 2 shows what happens if the valve changes its position due to movement of the piping. The dimension "A" of Fig. 1 lengthens when it becomes dimension "B" of Fig. 2. Failure to compensate for such dimensional and structural changes will result in binding of operating parts, failure of the extension stem or some other difficulty which will preclude successful operation of the valve.

Adequate provision can be made to avoid such difficulties. When a situation will occur as detailed in Fig. 2, the extension stem should be fitted with universal joints and a spline coupling or connection. The spline should be long enough to compensate for dimensional changes in the length of the extension stem, thus accommodating for movement of the valve.

When the valve and floor stand do not change position, the flexible joints and spline can be omitted from the extension stem. This situation occurs in cold water or similar piping where valves are not subjected to movement, or when the movement is negligible enough to be disregarded.

When floor stands are used with valves which are installed in piping that is subject to movement such as caused by expansion or contraction due to temperature changes, flexible joints and a spline coupling always should be added to the extension stems. High temperature steam piping is most typical of conditions where flexibility must be provided in extension stems between valves and floor stands. Two examples are included to illustrate this point.

High Temperature Piping Is Typical

Fig. 3 shows one of two identical 4 in. steam leads from boilers to a 6 in. header. A floor stand and extension stem were provided for the gate valve to facilitate its operation from a platform at a higher elevation. Steam conditions of 415 psi at 775 F and the flexible piping arrangement indicate movement of the 4 in. gate valve. It is apparent that universal joints and a spline coupling are needed in the extension stem, as detailed in the drawing.

Fig. 4 illustrates a similar situation — one of three 8 in. steam leads to turbines, operating at 690 psi and 835 F. This piping is below the turbine room floor and floor stands were specified for each of the gate valves. In this case, universal joints and splines are needed, not only for the extension stem of the main valve but for its bypass valve as well.

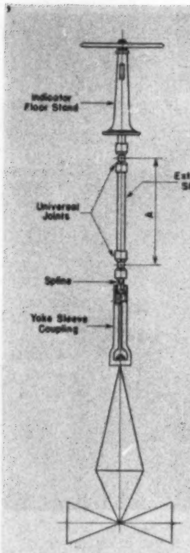

Indicator Floor Stand
Extension Stem
Universal Joints
A
Spline
Yoke Sleeve Coupling

FIG. 1—NORMAL POSITION (left corner) of valve and floor stand. Extension stem can be connected directly if common vertical center line is maintained

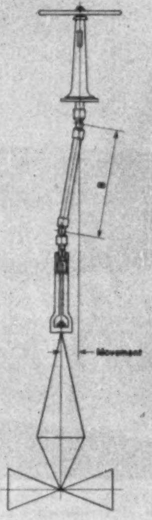


FIG. 2—CHANGED POSITION (next view) of valve due to movement of piping lengthens dimension "A" of Fig. 1 to dimension "B" and causes trouble

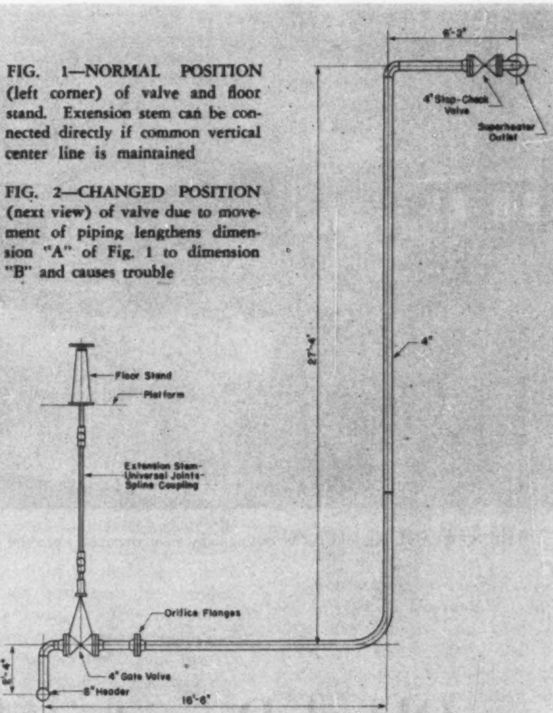
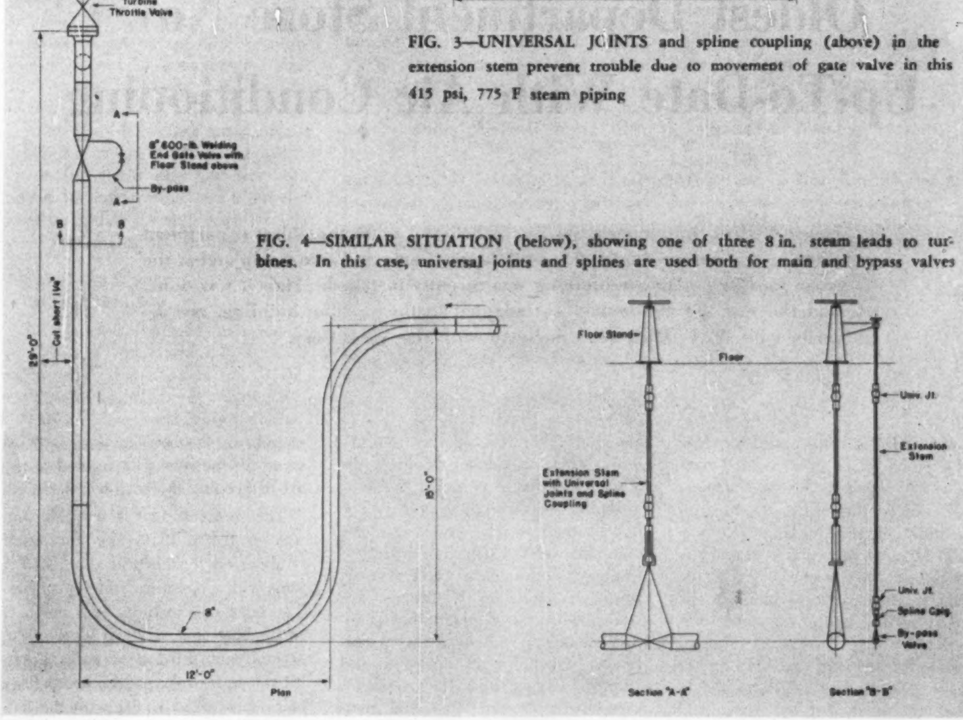

6'-2"
4" Stop-Check Valve
Superheater Outlet
27'-4"
4"
Floor Stand
Platform
Extension Stem-Universal Joints-Spline Coupling
Orifice Flanges
2'-4"
4" Gate Valve
8" Header
16'-6"

FIG. 3—UNIVERSAL JOINTS and spline coupling (above) in the extension stem prevent trouble due to movement of gate valve in this 415 psi, 775 F steam piping

FIG. 4—SIMILAR SITUATION (below), showing one of three 8 in. steam leads to turbines. In this case, universal joints and splines are used both for main and bypass valves


Turbine Throttle Valve
A
8" 600-lb. Welding End Gate Valve with Floor Stand above
By-pass
A
B
B
Cut short 1¼"
29'-0"
15'-0"
8"
12'-0"
Plan
Floor Stand
Floor
Extension Stem with Universal Joints and Spline Coupling
Univ. Jt.
Extension Stem
Univ. Jt.
Spline Cplg.
By-pass Valve
Section "A-A"
Section "B-B"

TRIMMINGS
NECKWEAR

THE NEW AND the old. The ceiling fans were removed when the new air conditioning system was put in operation

Oldest Department Store Now Up-To-Date With Air Conditioning

Hager & Bro., Inc., Lancaster, Pa., is believed to be the oldest department store in the country under the same family name and ownership and at the same location. Air conditioning was recently installed. How it was done, and the way the equipment was adapted to the existing building, are described by W. F. Otis, sales engineer with the York Corp.

Hager & Bro., Inc., Lancaster, Pa., is another example of the ever-growing demand for department store air conditioning. Located in the heart of this bustling Pennsylvania farming community, Hager's is the oldest department store in the country under the same family name and ownership and at the same location.

Founded in 1821 by Christopher Hager, the store is still young in spirit and ready for any promising change. Therefore it was not unusual when the Hager brothers decided to study a plan for air conditioning their complete store. The five brothers, who operate this store that does over $3 million worth of business a year, are E. T. Hager, president; William H. Hager, Jr., vice president and general merchandise manager; Nathaniel Hager, secretary and publicity director; and John C. Hager and R. C. Hager, merchandising and divisional merchandising heads. The store employs some 250 persons well trained in the art of keeping the customer satisfied.

The present five story addition was erected in 1910. The store itself is about 65 ft wide and about 230 ft long, with a basement and 4½ stories. The sales area includes over one-half of the basement, 6720 sq ft; the first, second and third floor sales areas, 13,150 sq ft each; and the fourth floor sales area, 9256 sq ft; with the balance taken up by the private offices located on that floor. The fifth floor, which extends about halfway back, is used for a general stockroom and for other miscellaneous services.

Budget Estimate Prepared

The problems of air conditioning the store were analyzed by the management in characteristic, commonsense manner. A budget estimate approximating the overall cost and outlining in general what would be entailed in the installation of this equipment and the benefit to be derived from it, the general type of plant design, and the yearly operating cost was first developed. Careful study of these figures led to the establishment of a definite budget and the decision to air condition the entire store.

To stay within this budget and secure what in their opinion would be the best installation for the money, the Hager brothers decided to employ the services of a competent consulting engineer and have him draw up complete plans and specifications and then put these plans out for bids among a selected number of competent mechanical contractors. After considering many topnotch consulting engineers, Paul H. Yeomans of Philadelphia was selected.

Many problems face an engineer designing an air conditioning installation for a building that has been added to, modernized and otherwise kept up-to-date through years of successfully serving the public.

Sales Area Space at a Premium

In this case, the sales area was at a premium and could not be used under any circumstances for the location of equipment.

The air distributing ducts had to be concealed or blended in with the general decorative design of the area in which they are installed. Chilled water mains had to be located out of sight and yet be accessible for any possible servicing and free from any disturbing vibration.

It was up to the ingenuity of the consulting engineer to use what little space was available to locate the compressors, pumps, air units and other vital equipment.

Mr. Yeomans drew up detailed plans and specifications showing the location of various air handling units, detailed ductwork arrangement and refrigeration and other equipment for air conditioning the sales area in the basement, the sales area on the first, second, third and fourth floors, together with the office area occupying the fourth floor. These plans and specifications were put out for bids from eight reliable contractors. The mechanical contract was awarded to the Lehigh Engineering Co., Bethlehem, Pa., which fabricated and erected the sheet metal and piping and furnished and installed the refrigeration and air distribution equipment.

A Hand Tailored System Designed

A careful analysis of the particular problem showed that a central plant, located in the basement, circulating chilled water throughout the building would result in the lowest initial first cost and the simplest operating control. This control is based upon a constant dew point and dry bulb temperature from the air units. The air units are equipped with bypass dampers whereby zone control can be obtained regardless of the loading of the particular area.

The general design of the refrigerating system was based on 80 F dry bulb, 50 percent relative humidity within the area and chilled water circulation to the units located on the various floors. Winter and summer thermostats at strategic points controlling the air handling apparatus and automatic water temperature control on the refrigerating cycle together with capacity control on the compressors enable flexibility.

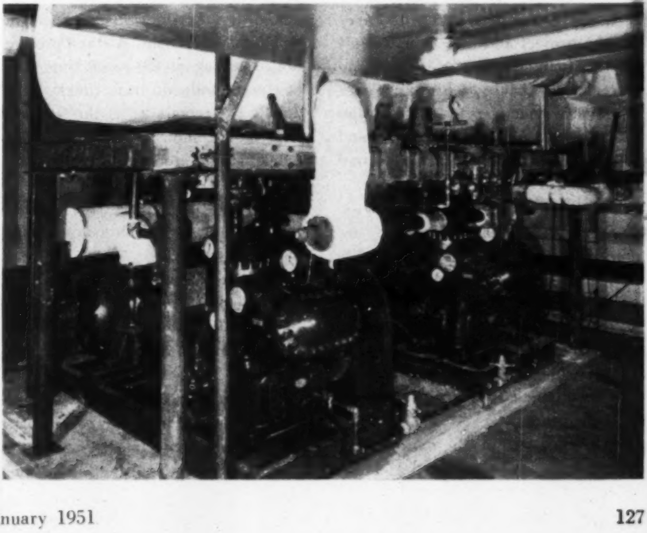
The specifications called for 150 tons of "Freon-12" refrigerating equipment composed of two 75 hp units with automatic capacity reduction together with their respective motors and control panels, horizontal shell and tube cooler surface handling 360 gpm of chilled water, and two evaporative condensers on the roof of the fourth floor sales area.

The central station equipment was installed in an unused basement area, a space only 18 ft x 22 ft. In addition to the two compressors, the water cooler pumps and a ceiling type air unit are installed in this basement area.

The basement is handled with a ceiling type air conditioning unit of 3000 cfm capacity equipped with steam and cooling coils, and with mixing dampers arranged for 100 percent outside air ventilation when desirable.

The first floor area presented two real problems. First, the air units had to be placed so that they would not be visible. Second, the duct work had to blend in with the dec-

LOW CEILING in this 18 by 22 ft area didn't prevent installation of the two 75 hp compressors, motors, control panels and other air conditioning equipment



orative arrangement of the area itself.

To meet these problems, two ceiling type units of approximately 2200 cfm capacity each were located above the display windows in front of the store and two additional units of about 3400 cfm capacity each were located in the work area at the rear of the store, with the control set up for zoning this area depending upon the population loading.

The second problem was overcome by carefully designing and arranging the duct work itself so that no objectionable unsightly equipment was visible and so that the ducts blend in with the general design of the area. By entirely concealing the ducts behind the false partitions above the displays on the side of the area an even air distribution is obtained with adjustable grilles; the return grilles in the panels blend in with the general arrangement.

On the second floor, two units were located behind the false partition at the front of the store and two more were located in the rear. The units in the front of the store have a capacity of 4300 cfm each and the ones in the rear have 2900 cfm capacity each. There is no objectionable exposure of duct work or air units on this floor.

The third floor is handled with two units in front of the store of 4500 cfm each with two units in the rear of the store of 3200 cfm each. Again the careful duct design was so arranged as to make no perceptible distortion of the general decorative design of the area.

The top floor was subject to more difficulties as far as duct work arrangement was concerned. Here again two units of 5170 cfm and 4250 cfm were located in front of the store and one unit of 8600 cfm in the rear area. The larger of the front units also handles the main office with separate zone control through volume dampers and properly located thermostats.

Year 'round conditioning at Hager's provides well filtered, clean air to the store, reducing stock spoilage and building sanitation, painting and cleaning costs. Further, an ample supply of outside air for ventilation eliminates odor problems.

It was essential that the control system be properly designed for load fluctuations and varying outside conditions. Areas had to be carefully zoned to maintain uniform air distribution and yet keep constant conditions under shifting loads in the space. The use of outside air for cooling during the crowded Christmas and Easter sales is another feature of this control system. It is the "policeman" of any air conditioning installation, assuring maximum results with the greatest economy of operation.

CELEBRATE CENTENNIAL OF ENGINEERING IN '52

PLANS UNDER way to celebrate the Centennial of Engineering in Chicago in 1952 have been announced by the American Society of Civil Engineers, oldest of the country's national engineering organizations.

Major Lenox R. Lohr, president of the Chicago Museum of Science and Industry, has been elected president of the not-for-profit corporation, Centennial of Engineering, 1952, Inc., which has been set up to carry out the project and direct the overall activities connected with it. His aid was sought because of his experience as general manager of the Chicago World's Fair of 1933 and 1934, and as president of the Chicago Railroad Fair of 1948 and 1949.

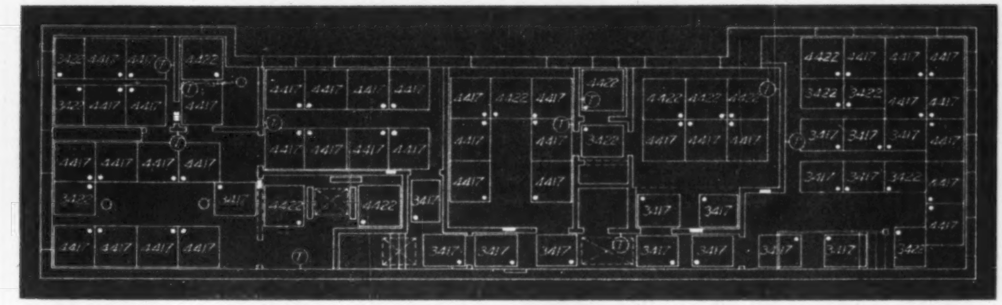
The celebration, including an exposition and a convocation of engineers, will occupy the approximate period, July 1 to September 30, 1952, and will be centered in the Museum, which already houses the world's greatest collection of industrial and science exhibits and is ideally adapted to the objectives of the celebration.

According to preliminary plans, the observance will consist of a variety of activities for both the general public and the professional engineer. Opening in early June will be a new permanent educational exhibit installation designed to bring home to visitors the tremendous contributions made by engineering during the past 100 years to the development of the nation and the elevation of the American standard of living. There will be appropriate temporary exhibits by engineering and industrial firms. A stage production, opening at the same time, will be presented several times daily during the remainder of the summer. A dynamic show of high entertainment value, the production will utilize a great variety of full-size equipment in telling the human interest story of technical advancement.

The greatest convocation of the engineering profession ever held is scheduled to take place between September 3 and 13. Nearly a hundred national, international and regional engineering societies will take part, as will the great engineering schools. The Department of State has stated its intention of collaborating in arranging for participation of foreign and international engineering organizations.

Each participating society will arrange and finance its own program in coordination with the others, while the Centennial of Engineering will be responsible for the exposition and for general coordination of other activities.

In discussing the plans, Major Lohr has stated that "Engineers comprise about three-tenths of 1 percent of the people in the United States. Probably no other group has contributed more toward developing the resources of the country, and bringing our standard of living to a level never before approached, than engineers, yet most of the other 99.7 percent have little if any realization of that fact. To the public mind, a veil of mystery clouds understanding of engineering principles, methods and accomplishments . . . . Our citizens do not know to what extent the welfare of our nation in peace and its salvation in war depend upon the accumulated and continuing results of engineering research and its application."



ELECTRIC PANEL heating layout for third floor of the building. The dots indicate the connectors, "T" the thermostats and the figures the panel dimensions and the watts per sq ft ("3417" means a panel 3 ft by 4 ft, 17 watts per sq ft)

Electric Ceiling Panels Heat Floor Added to Building

When more space was needed in a two story building — and there was no room to expand "sideways" — the problem was solved by adding a third floor. How to heat the added space was the next problem, due to limited capacity of the existing boiler installation. The situation was met by installing electric panels in the third story ceiling. The basis for design, installation, control, estimating operating costs, etc., are described here

ELECTRICAL CONTRACTORS, Inc., needed room for expansion but wanted to remain in the same building just north of Chicago's "Loop." Since there wasn't room to spread out, they had to build higher.

It was found that, by taking out one course of brick at the top of the second floor and dropping the joists down, a third floor could be added which would give space for offices, a drafting room, estimating room, lounge, lunchroom and kitchen for preparing one meal a day.

How to heat the additional space presented a problem, as the stoker fired steam boiler in the basement has capacity only to heat the first and second floors. A larger boiler would mean installing risers to the top floor. The solution was a ceiling electric panel heating system for the new floor costing some $2000.

Basis of the Design

The heat loss of the proposed third floor was calculated from the architect's drawings. One of the requisites for the electric heating was that the building be well insulated. The design was based on the following conditions: An outside design temperature of —10 F; a prevailing wind of 12.8 mph; 257 days requiring heat during a normal season beginning September 21 and ending June 4; and 6300 degree days. The inside design temperature was assumed as 68 F, possible because of the warm room surfaces and the direct radiant transfer of energy to the occupants.

Estimating Required Power Input

The following formula was used to find the power input necessary.

$$\text{Wattage required} = \frac{(\text{Btu loss})\,(1.15)}{3.412}$$

This formula includes a 15 percent safety factor to take care of extreme winter days, variations in tightness of construction, high wind velocities, variations in voltage supply, panel resistance, etc. This excess capacity is below that generally installed where heating systems must "pick up" a cold building. With electric radiant heat this is not required, since the radiant effect is apparent within a few minutes after the panels are turned on.

For a quick approximation, each room's ceiling area was divided by 16 to obtain the number of 4 by 4 ft panels that could be installed. This size panel fastens to joists having standard 16 to 24 in. spacing. However, if the room dimensions didn't accommodate this size panel, other were used measuring 3 by 4 ft. There are also panels 4 by 8 ft.

The next step was to find out if this maximum number of panels was needed. This was done by dividing the wattage required by the wattage of the individual panels. The panels are rated at 220 volts as follows:

4 by 4 ft panels: 58 Btu, 17 watts/sq ft = 272 watts
4 by 4 ft panels: 75 Btu, 22 watts/sq ft = 352 watts
3 by 4 ft panels: 58 Btu, 17 watts/sq ft = 204 watts
3 by 4 ft panels: 75 Btu, 22 watts/sq ft = 264 watts

However, this installation was for 208 volts instead of 220 so a correction factor was used. (By using 220 or 208 volts instead of 110, it is possible to reduce wire sizes, fewer electrical circuits are required, the size of the control equipment is smaller and there is a reduction in the overload protection required).

Both 17 and 22 watt panels were included in the layout for this installation. Ordinarily, 17 watt panels are used for ceilings from 7 to 8½ ft high, and 22 watt panels for ceiling heights from 8½ to 10 ft. However, the 22 watt panels were used here to localize heat near large windows and along outside walls where there was considerable heat loss.

Arrangement of the Panels

When the number of panels for each room was determined, they were fitted into the ceiling space from an architectural or decorative standpoint. The most desirable arrangement of panels is around the edges of the room with the center part of the ceiling filled in with building board, leaving room for ceiling lights. The entire ceiling of a room is not covered with electric panels except in extremely small rooms or those with abnormally great heat loss.

The peripheral pattern gives a greater degree of direct radiation to the room and provides a slight air circulation which is desirable from a comfort standpoint. The slight air circulation created by peripheral arrangement of panels is desirable in dispersing tobacco smoke and kitchen odors, both of which were encountered in this particular installation.

The temperature of the heated panels is assumed to be 120 F. This is the maximum average temperature at which the panels will operate on the coldest day and is on the safe side for computing purposes.

How the System Is Controlled

When the panel arrangement was determined, the next consideration was control. A thermostat was provided for each circuit for flexibility and individual room control. The thermostats are on the inside walls approximately 60 in. above the floor and out of line of drafts.

The thermostats have a range of 55 to 85 F. There is an "off" position which disconnects the circuit completely. Since the operating differential doesn't exceed ½ deg for maximum comfort, 24 volt control equipment is used.

Insulated buildings cool off slowly when the power is off, and the low thermal inertia of electric panels provides fast pick-up when the power is turned on. Therefore, it is felt to be logical to turn the heat off in unoccupied rooms. When the minimum temperature is set at 55 F, it takes from 4 to 7 hr for this insulated heated building to cool to this point if the outside night temperature is zero. With an outside day temperature of 20 F, it is 6 to 12 hr before the building cools to 55 F. When the panels are turned off, they have warmed surrounding surfaces enough for them to continue to radiate heat and maintain comfort for a while.

Panel calculations were checked by the following table. It shows the approximate panel area for the total ceiling surface.

Design temperature	Percent coverage
—15 F and lower	70
—10 F	70
— 5 F	65
0 F	65
5 F	60
10 F and higher	60

As the design temperature is—10 F, 70 percent of the ceiling should consist of electric panel in accordance with this tabulation. Since the ceiling contains 1600 sq ft, there should be 1120 sq ft of panel. However, because of heat rising from the steam heated rooms below, this was reduced to 1040 sq ft of panel.

Electrical Contractors

MORE ROOM was needed, so a third floor was added to this building. How to heat the additional space was the problem which was solved by the installation of a ceiling electric panel system

If the lower floors were heated with electric panels, floor insulation would have been necessary in all rooms, whether those below were heated or not, because the panels wouldn't have enough capacity to offset the heat loss through an uninsulated floor. Heat loss upward from panels in multiple story buildings is added as an additional supply of heat to the upper floors, and subtracted from the heat requirements of the rooms below.

Estimating the Operating Costs

Preliminary calculations included an estimate of operating costs. The following formula was used:

$$\text{Annual kwhr} = \frac{0.3 \times \text{cu ft} \times \text{degree days}}{1000}$$

If the rooms to be calculated have 8 ft ceilings, the following formula can be used.

$$\text{Annual kwhr} = \frac{(2.5)\ (\text{sq ft})\ (\text{degree days})}{1000}$$

Third floor ceiling height in the building is 8½ ft. This gave an answer of 25,704 annual kwhr, or in round numbers, 26,000. These formulas apply when electric ceiling panels are used for primary heating, and must be modified for supplementary heating installations such as this one.

There are 71 panels controlled by 10 thermostats. The power distribution cabinet is in the hall on the third floor and contains transformer relays, low voltage control wires, branch switches and fuses.

Controls consist of one thermostat operating on 24 volts for each circuit.

The heating panels are connected in groups of parallel circuits. The thermostat actuates the transformer relay which switches on and off the current to the panels on that circuit. The total connected load is 19 kw.

As the installation and wiring of the panels in each room was completed, the panels were turned on and checked after a short time by feeling the surface of each panel for heat. Then the thermostat was turned to the "off" position while one of the installers listened for the click of the relay as the circuit opened. The service switch was opened before wiring the next room was begun.

When the entire installation was completed, a final test was made of the electrical connections. This was done by measuring total connected load at the service supply switch. This load should check with the total installed load of the panels within plus or minus 10 percent. Resistance of the individual panels is as follows:

272 watt panel = 177.9 ohms
352 watt panel = 137.5 ohms
204 watt panel = 237.3 ohms
264 watt panel = 183.3 ohms

It was found that there was less current flow than calculated, and this meant less heat was being delivered than called for by the design. Further investigation showed that the decrease was caused by a 10 volt drop; the panels were operating on 198 volts instead of 208. Fortunately, the panels were installed with sufficient extra capacity to make up for the decreased heat output.

Operating costs have proved to be reasonable. Energy used during the last heating season, October 22, 1949, to May 22, 1950, totalled 4820 kwhr, which cost $288. It was possible to reduce current consumption by turning down the thermostats during the night and on week-ends, as sufficient heat filters in from the rooms below to maintain temperatures well above freezing.

Power savings would be possible with an automatic load regulator containing a double throw switch which connects the 220 volt heating load to 110 volts, thus reducing the heating load. It makes this change when there are simultaneous high demands from cooking, lighting and heating.

When electric panels operate on 110 volts instead of 220, they emit less heat and make allowance for heat that will be given off by cooking and lighting. This means better heating for the user and better load characteristics for the utility.

Another possibility would be the installation of a time switch to turn off the heat overnight and week-ends. Otherwise this operation is subject to possible forgetfulness.

EMPIRE STATE BUILDING AIR CONDITIONS

Award of a $1.5 million contract to Starrett Brothers & Eken, Inc., for the installation of a system to provide the Empire State building [New York City] tenants with facilities for air conditioning was announced last month by Lieutenant General H. A. Drum, president of Empire State, Inc.

Footings for steel structures to support cooling towers that will reach 100 ft above the street were poured behind the building's new off-street loading annex on 33rd St. A chilled water cooling plant, which will occupy 4000 sq ft, will be installed in the building's sub-basement. A distribution piping system to provide chilled water to tenants will extend to the building's 86th floor.

"We have spent five years carefully surveying the possibilities of such a project," General Drum said. "We started with the premise that it would be unfair to force tenants to accept and pay for air conditioning if they did not want it. We finally worked out our new system, which will provide chilled water at reasonable rates to tenants who desire it. The tenants need only provide inexpensive units for converting the chilled water to conditioned air."

The system is expected to be installed and in operation by May 15.

The chilled water piping system is divided into three zones to avoid excessive pressure developing at each of the tenant floors. The piping, varying in size up to 14 in., and weighing over 100 tons when filled with water, will be supported by special spring hangers that provide for expansion and contraction and avoid concentration of the load at any one point.

Plans call for installing pipes up to the 86th floor, but lack of time and current material shortages will make it possible for the building to supply chilled water service to its first and second zones only in time for use next summer. The service will eventually be made available to tenants in the upper stories of the building.

Conservation of city water is an important feature of the new water chilling plant.

Water will be chilled to approximately 40 F as it leaves the refrigeration equipment and is pumped up insulated pipes to a floor where it is to be used. Pipes will be installed in existing pipe shafts. Tie lines will connect the central pipes to tenants' air handling units.

Empire State's plant will employ advanced engineering techniques. The cooling towers have been designed to minimize the possibility of noise and fog in the surrounding areas.

The York Corp. refrigeration installation will ultimately develop 3500 tons, requiring 4500 hp to operate its heavy mechanical equipment. Motors as large as 700 hp will be used, and provisions are being made for the future installation of a 1000 hp unit.

Design of the system presented unusual problems, since there was no precedent for cooling a building of this height. New methods of installation and specially designed equipment were necessary to withstand hydrostatic pressure in excess of 600 psi.

Installation of the chilled water distribution system has been planned so that tenants' space will not be touched, despite the magnitude of the operation.

The Consolidated Edison Co. of New York is providing new underground transformer capacity at the building to serve the large power requirements for the cooling plant.

The services of Edward E. Ashley were retained as consulting engineer for the project, with the office of Edwards & Hjorth retained as structural engineers.

Starrett Brothers & Eken, Inc., general contractors and builders, have employed Almirall & Co., Inc., to provide the mechanical work, with L. K. Comstock & Co., Inc., making the electric power wiring and switchgear installations.

Regulating Use of Water for Air Conditioning

Here is the report of the American Water Works Association's committee on water use in air conditioning and refrigeration presented at the 1950 annual conference of the AWWA in Philadelphia. The report includes, as an appendix, a "model" ordinance. The committee comprises Frank C. Amsbary, Jr., chairman, Elwood L. Bean, L. L. Lewis, and Marsden C. Smith

WATER SHORTAGES made headline news last year. Water conservation methods are of national importance

IN ITS FIRST report[1], presented at the 1949 annual conference, the committee on water use in air conditioning and refrigeration of the American Water Works Association outlined several objectives which it wished to realize before the 1950 meeting:

1) To obtain the cooperative attention of the manufacturers of refrigerating equipment to the seriousness of water demand with the feeling that the industry can do much in the design of equipment to reduce this to a minimum;

2) To investigate demand charges for water as the possible solution of many problems;

3) To sample the reaction of regulatory bodies to the problem;

4) To submit a guide, or outline regulations, for the consideration of those whose systems are indicated by study as needing such an approach for the solution of their immediate problems.

The first progress report provoked a considerable amount of discussion. It started on the floor at the 1949 conference after the report had been given and continued in an article[2], which was followed by letters from readers giving their opinions, pro and con, on the thesis that the water utilities should push water sales to the limit, regardless of use. These discussions were concerned with the entire field of water use, of which this committee is detailed to study only a part.

The committee considers this atmosphere healthy and has welcomed the publication of these discussions. It is felt, however, that the objectives sought in the committee's work were not clearly understood, probably due to inadequate explanations at the 1949 conference.

To clarify the committee's position, its study is being confined to two classes of water systems. One class consists of those where the source of supply is inadequate or approaches inadequacy, with little hope of augmenting it economically. This matter involves natural resources and represents a situation which is either desperate now or promises to become so. The second class comprises those water systems with a source of supply which is presently adequate and will not become a problem at some future date, but where some link in the chain of physical plant facilities will be jeopardized if air conditioning and other refrigerating loads are not controlled. This situation will at some time in the future affect every water plant. The cost of tearing up streets for the purpose of enlarging sewers or water mains, or the enlarging of filter plants to meet purely summer loading, cannot be justified where these loadings can be reasonably avoided.

For the first class mentioned above, immediate restrictions on use are the only answer. For the second class, restrictions on use are not suggested; rather, through measures for conservation and the elimination of waste, the public utility should keep the demands within such economic limits that, if inadequacy approaches, augmentation of the physical plant facilities may be financed by the revenue received from the customers creating this inadequacy. Each customer should bear his share of the burden that he himself creates, and the customer who continues to use water at normal rates the year 'round should not be discriminated against through increased rates to finance improvements required by the low load factor usage of others. The applicability of this principle is generally becoming recognized.

The committee feels that it has done rather well in its work with the refrigeration industry. Through the efforts of L. L. Lewis, a member of the committee, one half-day session of the American Society of Refrigerating Engineers' 1949 annual meeting was devoted to this problem. Elwood L. Bean, a member of this committee, gave an excellent paper on the problems which refrigeration in all its applications presents to the water supply industry. The sections of this paper which deal most specifically with the matter of regulations appeared in the official publication of the ASRE[3].

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[1] Committee Report. Regulation of Water Use in Air Conditioning. Jour. AWWA, 41:715 (Aug. 1949).

[2] Gannett, Farley. Let's Sell Water. Eng. News-Rec., 143:21:39 (Nov. 24, 1949).

[3] Bean, Elwood L. Refrigeration and the Water Supply Industry. Refrig. Eng., 58:140 (Feb. 1950). Reprints obtainable at 35c per copy from Am. Soc. of Refrigerating Engrs., 40 W. 40th St., New York 18, N. Y.

Demand Charge Felt To Be Solution

The committee feels that in demand charges lies the solution to many problems of the water industry. The institution of a demand charge to be applied to any commercial or industrial installation, the character of whose load would justify such an approach, would solve not only the economic problem presented by refrigerating demands, but that of all other installations where short peak demands create a similar difficulty. If the demand charge is the answer, it will remove the grounds for an accusation of discrimination. It must never be forgotten that there are in existence many other uses which are an economic burden on the water utility, and thus an economic burden on all its customers.

There is a variance of opinion on the proper basis for demand charges. One approach is a fixed charge based upon the size of the meter, in addition to the consumption charges. The committee does not believe that this method is an adequate solution as it does not take into consideration the load factor which governs economical operation of any water plant or other utility. Demand charges based on 15 min intervals are the most common practice in the power industry, and the committee feels that this procedure would be equally applicable in the water supply industry.

The problem of producing a demand meter that may be economically purchased, operated and maintained has not been solved. Although the wishes of the committee for the development of such a meter have been called to the attention of the meter manufacturers and several are working diligently on the problem, none has come up with the answer. The committee will continue its search for a demand meter, and it hopes that at some future date it may announce success in this effort.

A third method that may be employed to place air conditioning and other refrigerating water use on an economic basis is a special rate to be applied to all accounts operating on a low load factor.

The end result of any of the above methods, if rates are properly based, would be to encourage the installation of water conservation equipment, thereby reducing water costs. Even if water conservation equipment is not used, the customer will be paying on a basis that makes such an account economically desirable to the utility.

Survey of Regulatory Bodies

The committee corresponded with the 26 state regulatory bodies, including that of the Territory of Hawaii, to sample their attitude on demand charges or regulations to control these peak demands. Fifteen replies were received. The questions and a summary of the responses are given below.

1) "If such a (demand) meter is developed, and a satisfactorily supported demand rate schedule is presented to you, would it receive favorable consideration?" Of those replying to this question, eight stated that the demand meter principle would receive careful or favorable consideration, three preferred a sliding scale minimum and two were opposed. One preferring the sliding scale minimum opposed the demand charge basis on the theory that water could be stored. The committee believes that this argument overlooks the heavy carrying charges needed for building adequate storage and increasing the capacity of other classes of physical plant to meet a 1000 hr load (out of 8760 hr in the year) that may be imposed by air conditioning. Two respondents did not express themselves on this question.

2) "If a demand meter is installed that requires electrical energy not exceeding 10 watts to operate, would you approve connecting to the consumer's power circuit and giving the consumer no credit for power used?" Of the eight replies approving a demand meter in principle, five saw no objection to connecting to the customer's light circuit and giving no credit for the cost of the energy used. In support of this approach, one stated: "Many of our telephone users now furnish electricity necessary for operating certain telephone equipment for local needs." Another stated: "Where power supply is necessary as an accessory to some other type of utility service, it is common practice for this to be supplied directly by the customers." Another stated: "It would be considered as one of the costs involved in providing service and, therefore, properly chargeable to the customer." One was opposed to the use of energy without due credit being given the customer. One conditioned his reply as follows: ". . . if agreeable to the consumer under Section — of the laws of the State, which provides for arrangements between the company and the consumer." One did not state his position for or against but observed: "Current used to operate a demand meter would have to be considered in the light of conditions existing at the time when (the matter is) presented for consideration."

The committee believes that the above statements add support to the demand meter approach, and it should be expected that the energy required would, generally speaking, be supplied by the customer.

3) "Certain conditions may indicate that a rule and regulation be adopted in preference to demand charges; would such rules and regulations receive favorable consideration?" Five affirmative replies were received, while the balance failed to answer. It seems to be of some importance that none answered "no."

Model Ordinance Presented

The committee presents in the appendix to this report a form which may be used for guidance in the preparation of an ordinance regulating the installation and operation of air conditioning and refrigerating equipment. The committee is not presenting or recommending this form as proper for general adpotion. The conditions and circumstances of the individual utility, its finances, methods of procedure and adequacy of personnel, all vary greatly. Likewise, the necessity or desirability of control, its purpose and urgency, and complications encountered are variables. Legal controls and verbiage are also variables, since no language is universal. The best solution for the individual community should be worked out by the water engineer and his legal adviser in cooperation with local refrigeration equipment representatives. The "model" form provided contains a wealth of ideas, each section of which should be considered, and modified or adopted as local circumstances dictate.

Editorial Note: No statement in the following "Model Ordinance" is to be taken to approve, or imply approval of, the use of water from a public supply and the subsequent return of such used water to the mains of the water utility.—Harry E. Jordan, secretary, American Water Works Association.

"MODEL" ORDINANCE REGULATING THE INSTALLATION AND OPERATION OF AIR CONDITIONING AND REFRIGERATION EQUIPMENT

(*Note: The term "Ordinance" is to be taken in its general meaning. A comparable document may be issued by the appropriate authority in any municipality empowered to issue regulations or orders.*)

. . . .

WHEREAS, the operation of water cooled refrigeration and other equipment for changing the dry bulb temperature or the humidity of air has rapidly increased and now involves the use of water in quantities never before anticipated, thereby placing unexpected burdens on the public water supply system which are detrimental to other water services,

AND WHEREAS, in the interest of the public and its water supply system, it is necessary to regulate the use of water for such purposes and to require conservation of water and elimination of waste, NOW, THEREFORE, BE IT RESOLVED, that the following regulations shall apply to all water cooled equipment installed for the purpose of reducing the dry bulb temperature or decreasing the absolute humidity of air, whether for comfort air conditioning, refrigeration, processing or whatever other purposes;

SECTION 1.—DEFINITIONS:

For the purpose of these regulations, the following terms shall have, and shall be construed to have, the following meanings:

(a) The terms "Air Conditioning System" and "Refrigeration System" shall include any combination of equipment, whether compressor or other type, by which heat is removed from the air and from which the accumulated or effluent heat is wholly or partially removed by the use of water.

(b) "Air Conditioning System" shall mean an installation for maintenance, by heat removal, of temperatures which are not less than 60 F.

(c) "Refrigeration System" shall mean an installation for maintenance, by heat removal, of temperatures which are less than 60 F.

(d) "System" shall mean any combination of apparatus, individual unit, group or collection of units supplied with water through any single customer service pipe connected to the public water system.

(e) "Person" shall mean and include a natural person, partnership, corporation or association. Whenever used with respect to any penalty, the term "person," as applied to partnerships or associations, shall mean the partners or members thereof, and as applied to corporations, the officers thereof.

(f) "Superintendent" ("Commissioners", "Director" or other title) shall mean the chief officer of the (*name of water utility*) or such officer or agent as he shall duly authorize to act in enforcement of these regulations.

SECTION 2.—PERMIT REQUIRED

No person shall install, operate or use any equipment for air conditioning or refrigeration which requires a supply of water from the system of the (*name of water utility*) without first having procured written permit therefor from the Superintendent.

SECTION 3.—APPLICATION FOR PERMIT

3.1. Application for permit shall be made to the Superintendent and shall provide the following information:

(a) Name and address of the applicant.

(b) Location of the premises where installation is proposed.

(c) Name and address of the owners of the premises.

(d) Names of manufacturers of the units requiring water.

(e) Manufacturer's identification and classification of the refrigeration units.

(f) Manufacturer's rating of maximum refrigerative capacity of the unit or units under the conditions of the planned installation. Rating may be stated in tons per 24 hr or in Btu per hr.

(g) Horsepower of compressor prime mover, if unit is of compressor type.

(h) Where water conservation devices are required (to comply with Sec. 7 hereof), the manufacturer's name, identification, classification and size of the conservation equipment.

(i) Elevation and plan showing general piping arrangement and details of all points of connection to building supply water piping (Piping direct to condenser units, makeup supply into tower pan and so forth).

(j) Such additional information as shall be required by the Superintendent.

3.2. Applications shall be signed by the owner or tenant, and applications for installation shall designate a plumber duly qualified to receive permits under other sections of these regulations.

NOTE: For the purposes of these regulations, in no event shall the rated capacity in tons be considered less than the following:

(1) Total maximum Btu per hr of capacity of the installation divided by 12,000; or

(2) The nameplate horsepower of any compressor prime mover unit for any air conditioning installation; or

(3) Two-thirds the nameplate horsepower of (2) above for any refrigeration installation.

In the absence of the required manufacturer's maximum rating (Sec. 3.1 (f) above), the Superintendent may specify the tonnage of the installation at the ratings indicated by (1), (2) or (3) above; or, if these appear inadequate, then by whatever other measure of capacity appears to him to be proper.

(Note: In using methods (2) or (3) above, the Superintendent must realize that, for purposes of evading some restrictions recited herein, the motor may purposely be improperly sized or erroneous ratings may be stated. Therefore, the inspector must be satisfied of proper sizing or rating when using these methods.)

SECTION 4.—FEE FOR PERMIT

A fee shall be paid, at the time of application for a permit, to cover one inspection of the installation. The fee shall be ——— dollars, plus ——— cents per ton of capacity. For each additional inspection required because of condemnation of work, or because of premature request for inspection, an additional charge shall be made, equal to 75 percent of the original fee.

(Note: The amount of fees under this section should be determined by the local water utility, based upon local costs incurred in comparable inspections.)

SECTION 5.—PERMIT TO INSTALL

5.1. Permits to install piping or connect equipment will be issued at (*title and address of permit issuing office*) but only in the names of licensed and bonded plumbers who are duly registered to perform plumbing work within the area of the premises involved, or to plumbers in the employ of the municipal, state or federal governments for premises in their respective charge.

(Note: If the municipality does not require plumbers to be bonded or licensed or registered, it is recommended that the same standards already in use in the locality be adopted in the above section.)

5.2. Within 48 hr following the completion of any work authorized by permit, notice of completion and request for inspection shall be returned in writing, by the plumber receiving the permit, to the office from which the permit was obtained.

SECTION 6.—PERMIT TO OPERATE

After final inspection and approval of the installation, a permit to operate or use the equipment will be issued at (*title and address of permit issuing office*) in the name of the owner or tenant.

SECTION 7.—WATER USE AND CONSERVATION

7.1. Systems with a capacity of ——— tons (per 24 hr) or less shall not use water directly (or indirectly, except when used with conservation equipment) from the public supply.

(Note: The local utility should determine the limits as may be found most suitable to local conditions. Air cooled units up to 3 ton capacity have been found practical if conditions of installation afford passageway for the proper volume of cooling air to and from the condenser.)

7.2. Systems with a total capacity of more than ——— tons (per 24 hr) but not exceeding ——— tons (per 24 hr) may use water directly from the public supply, at a rate not exceeding 2.0 gpm per ton if the water temperature is 75 F or less, or 3.0 gpm per ton if it is above 75 F, provided they are equipped with an automatic regulating valve which will (1) stop the flow of water when the refrigerating machine is shut down and (2) throttle the flow of water down to the momentary requirements of the system.

(Note: The first blank in Paragraph 7.2 is to be filled in using the same value as was decided upon in Paragraph 7.1 of this section. The value used for the second blank must again be determined by local conditions. It has been found that 5 or 5.5 tons is the most generally accepted limit. Whether the dividing line between conservation and no conservation is to be lower or higher than the stated 5 or 5.5 tons is entirely a local problem, which must be solved according to the facts existing in each individual community.)

7.3. All systems having total capacities exceeding ——— tons (per 24 hr) shall be equipped with evaporative condensers, cooling towers, spray ponds or other water cooling equipment. This equipment shall be of sufficient capacity to insure conformance with the requirements in Table 1 for makeup water when operating under full loading at maximum summer temperatures:

(Note: The blank in the first sentence of Paragraph 7.3 is to be filled in using the same value as was decided upon for the second blank in Paragraph 7.2.)

Table 1—Maximum allowable water use

Water Hardness ppm	Max. Use gpm/ton
0 — 139	0.1
140 — 199	0.15
200 — 254	0.2
255 — 339	0.3
340 — 424	0.4
425 and over	0.5

SECTION 8.—SANITARY PROTECTION

8.1. On installations which operate with the use of water directly from the public supply system, every direct connection shall be equipped with a suitable brass body, brass fitted check valve installed in the branch supply line to each unit.

8.2. Discharge connections for the disposal of waste waters shall be in strict accordance with applicable rules and regulations of state and local health and regulatory bodies.

8.3. Cooling waters which are to be reused for other purposes shall be provided with free, above-the-rim discharge before entering other equipment; otherwise, permission shall be obtained in writing from the Superintendent, approving the proposed connections and use.

8.4. On installations other than those described above, there shall be a physical break between the public water supply piping and the piping of the installation, so arranged as to make impossible back siphonage to the public water supply system.

SECTION 9.—REVOCATION OF PERMIT

Any permit which is issued under these regulations to operate or use equipment may be revoked by the Superintendent for any one of the following reasons:

(a) Failure of the holder of the permit to discontinue using water for the purposes covered by the permit, immediately upon notice to do so issued by the Superintendent during an emergency or to forestall an impending emergency.

(b) Alterations, changes of equipment or piping, improper operation or lack of maintenance which results in conditions that (1) are hazardous to the potable water supply either within the premises or in supply mains, or (2) cause unnecessary waste of water.

(c) The use of water is found to exceed the quantities permitted under Section 7 of this ordinance.

(Note: Many municipalities have general provisions in their administrative codes for giving notice and holding hearings. If such provisions are not sufficiently broad to cover this ordinance, it is recommended that the municipality include a provision for giving 10 days' notice to the consumer and for holding a hearing before the water department prior to discontinuing water service. Where such a provision is added, the municipality should examine its police powers to confirm that they are sufficiently broad to terminate service in the event the public health is in danger.)

SECTION 10.—EFFECTIVE DATE

10.1. For new installations, these regulations shall be effective 15 days after adoption. Publication shall be made in accordance with provisions of any applicable laws, acts, opinions, ordinances or regulations.

10.2. Existing installations shall be modified to conform to the provisions of these regulations; applications to operate shall be filed and permits shall be obtained. Modifications shall be completed and permits obtained in accordance with the provisions of this paragraph within six months after adoption.

10.3. Existing installations conforming to the provisions of these regulations in all matters except the conservation of water shall not be penalized under provisions of Sec. 11 for failure to provide conservation for a period of one year after adoption. Such installations shall, however, be subject to all other provisions of these regulations six months after adoption. In the event that a critical condition develops in the system, subsequent to 15 days after adoption, all installations not equipped to conserve water shall be subject to immediate discontinuance on orders of the Superintendent.

SECTION 11.—PENALTIES

11.1. Failure to comply with the above regulations shall be sufficient cause to penalize the licensee by:

(a) Payment of ——— dollars per ton capacity, but not to exceed ——— dollars for each violation. Each day that such violation continues shall constitute a separate violation.

(b) Discontinuance of service for failure to correct the violation promptly after notification or failure to pay penalties within 10 days after notification of their imposition.

11.2. Any person who violates the provisions of this ordinance and fails to comply with notifications to correct such violation and to pay the penalties assessed, or who repeatedly violates such provisions, may be deemed guilty of a misdemeanor and, upon conviction thereof, shall be subject to a fine not exceeding 10 times the penalty previously stated, or imprisonment for not exceeding 100 days, or both such fine and imprisonment.

11.3. Licensed plumbers guilty of violation of any of the rules and regulations herein shall be prohibited from securing further permits from the (*name of water utility*), and, where willful violations warrant, the Superintendent may prefer charges to the proper authority, seeking revocation of the plumber's license.

(Note: If the municipality has an administrative code setting forth the procedure to be followed for hearings, this procedure should be incorporated in the ordinance in connection with the imposition of penalties. If no such procedure now exists, the municipality should provide for hearings before the water department prior to the imposition of any penalty.)

SECTION 12.—INCONSISTENT ORDINANCES

All regulations, ordinances or parts of ordinances heretofore in effect which are in conflict with, or which are inconsistent with, the provisions of this ordinance, to the extent of their inconsistency are hereby repealed.

SECTION 13.—SEPARABILITY

The invalidity of any section, clause, sentence or provision of this ordinance shall not affect the validity of any other part thereof which can be given effect without such invalid part or parts.

Distilled Water From Radioactive Wastes

HOW EXTREMELY pure distilled water is extracted from dangerous radioactive wastes was revealed at the 118th national meeting of the American Chemical Society by a scientist of the Knolls atomic power laboratory, operated near Schenectady, N.Y., by the General Electric Co. for the Atomic Energy Commission.

Dr. George E. McCullough, G. E. chemical engineer, said the KAPL disposal unit, recently placed in full operation, is believed to be the most complete and systematic plant of its kind thus far built. It is capable of handling over 2,250,000 gal of waste per year, on a three-shift basis.

Wastes from all parts of the laboratory are collected in stainless steel tanks, each of 10,000 gal capacity. After a tank becomes full, and a sample is tested, the contents are fed into an evaporator which is really a huge still, operating in a partial vacuum. The water comes off as vapor, which is then condensed and collected in one of two 5000 gal tanks. Again a sample is tested. If the radioactivity is sufficiently low, it is discharged into the storm sewer and thence to the river. If not, it is passed through the evaporator and distilled again. Such water is really pure enough to use in the laboratory laundry, and for various other purposes, though this is not being done at present.

The material which was dissolved or suspended in the waste liquid is concentrated at the bottom of the evaporator as a thick "slurry" or mud, Dr. McCullough said. It is still sufficiently fluid to be pumped through pipes, to a vacuum drier where it is spread on a large heated stainless steel rotating drum. As it turns, the remaining water evaporates and the dried waste is scraped off, to fall through a chute into a room below which is shielded with concrete walls. By means of remote controls, operated in another room, stainless steel cans are lifted into place to collect the solid wastes.

At present, Dr. McCullough explained, the drums of solid radioactive material are being stored. They contain such a mixture of chemicals that it is not practicable to attempt any separation of useful radioactive elements. Their ultimate disposition has not yet been decided, though one possibility is that they will be imbedded in concrete blocks, carried out to sea and dumped.

Methods of Making PIPING FLEXIBILITY *Analyses*

Theodore E. Bridge Gives Step-by-Step Instructions for a Scheme for Calculating Flexibility of Piping Systems

THE THEORY TO BE used in the calculation of piping flexibility by the method under discussion here has been completely reviewed in the October, November and December issues of HPAC. It remains now only to summarize the procedure to be followed in solving actual problems. The procedure described applies equally well either to three plane or one plane problems. The drawing must show a three plane problem in both plan and elevation, whereas only one view need be made for one plane problems.

Mr. Bridge acquired a wide experience in the design of power and process piping during 15 years with E. I. du Pont de Nemours & Co., and has also had experience in the field of very high pressures. At the time he prepared this article, he was a mechanical engineer with the University of Chicago in connection with a project under construction for the Argonne National Laboratory; he is now associated with Tube Turns, Inc. He has taught several other engineers to use the method described here in figuring flexibility of piping systems, and they have found it as useful as has he. Theory of the method was reviewed in the October, November and December issues of HPAC, and the procedure to follow in solving problems is given—with examples—this month. The concluding article will solve the same two problems solutions of which by other methods have previously appeared, as a comparison of the applicability of the various available methods.

Step-by-Step Method for Use

1) The first step is to prepare a plan view of the piping. To save time, the author usually works with colored crayon directly on a print showing the piping arrangement.

2) The pipe bends are next squared out to simplify the calculation.

3) Next, a straight line is drawn between anchors and an elevation of the piping viewed normal to this line is drawn. This elevation will show the true distance between anchors (L'') which may be scaled off from the drawing.

4) Equation 22 is then solved ($Z'' = 12\ e\ T\ L''$)

5) The piping is then divided into two sections, with the same length of piping in each section.

6) The center of gravity of each section is roughly spotted by eye. The center of gravity of one section is called point P and the other point Q. These points will show both in plan and elevation. Note that, if the pipe is not all of the same diameter, each portion should be weighted inversely in proportion to its moment of inertia in calculating the center of gravity. If one section is of much larger diameter, it may be ignored altogether and assumed to have zero weight as it will have virtually no effect on the flexibility of the system.

To simplify this calculation, it is often easier to calculate an equivalent length for the larger diameter pipe, in which the true length is reduced with a factor equal to the ratio of the moments of inertia of the pipe.

Further, if a portion of the piping is guided or otherwise restrained from bending, it must also be assumed to have no weight insofar as locating the center of gravity is concerned. Also, its length must be reduced to zero in equations 14 and 15 [page 94, November HPAC] as it will have no effect on the flexibility of the system if it is not permitted to bend.

7) Line PQ is drawn in both plan and elevation, and point O, the center of gravity of the system, midway between points P and Q, is spotted. This line is called the center of gravity axis.

8) Mitchell's axis is drawn through point O in both plan and elevation and this axis is made parallel to a line connecting the anchors.

9) The thrust axis is drawn in both plan and elevation midway between the two axes drawn in paragraphs 7 and 8 above.

10) The angle that the thrust axis makes with Mitchell's axis is measured in both plan and elevation. Cp is the angle in plan, and Ce the angle in elevation. Calculate $\cos C = (\cos Cp)(\cos Ce)$. This value for $\cos C$ will later be used in equation 23 [page 97, November] to calculate F.

11) Each corner of the system in both plan and elevation is labelled. A point on the pipe in plan must be projected over into the elevation and carry the same label in both views.

12) Each point where the pipe crosses the thrust axis is labelled in both plan and elevation. The point where the pipe crosses the thrust axis in the plan view must show the same label after it is projected into the elevation, and vice versa.

13) The distance Y for each point is measured. This is the distance from the point to the thrust axis. This must be done for all points labelled in both plan and elevation. All values for Y are tabulated in a manner similar to that shown in the examples.

14) All values for Y are squared and the results tabulated, as is done in the examples. This is done in a separate column for both plan and elevation.

15) The value of Y^2 for a point in plan is added to the corresponding value of Y^2 for the same point in elevation. This gives the square of the true distance from the thrust axis for the point in question (The square of the hypotenuse of a right triangle is equal to the sum of the squares of the other two sides.)

16) The square root of the sum figured in paragraph 15 above is taken to find the true distance of each point from the thrust axis.

17) Y^*, which is the numerical difference between successive values of Y calculated in paragraph 16 above, is calculated. Y^* is always taken as plus.

18) Each value for Y obtained in paragraph 16 above is cubed.

19) $(Y^3)^*$, which is the difference between successive values for Y^3, is calculated. [It is not equal to the cube of the difference, $(Y^*)^3$]. $(Y^3)^*$ is always taken as plus.

20) Values of L^*, the true length of pipe between successive points shown either on plan or elevation, are measured and tabulated.

21) Equation 14 [page 94, November issue] is solved for values of $3\ M$ for each section of pipe and the results tabulated as shown in the examples. If $Y^* = 0$ or if it is nearly equal to zero, equation 15 is solved as equation 14 will be indeterminate under these conditions. (This was necessary in examples 2 and 6).

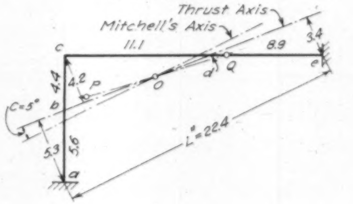
22) All values for $3\ M$ calculated under paragraph 21 are totalled to obtain the total value of $3\ M$ for the system as a whole.

23) The value for $3\ M$ is divided by 3 to obtain the value for M for the system as a whole.

24) Equation 23 is solved for F. $F = \cos C\ Z''\ E\ I / 1728\ M$. The calculation of $\cos C$ was explained in paragraph 10 above.

25) Equation 16 [page 94, November] is solved for S using the largest value for Y that can be found in the tabulation. $S = 6\ F\ Y_{\max}\ D''/I$.

EXAMPLE No. 1



	True Dist. from Thrust Axis		3M=L*(Y³)*/Y*			
	Y	Y³	Y*	(Y³)*	L*	3M
a	5.3	150				
			5.3	150	5.6	159
b	0	0				
			4.2	74	4.4	78
c	4.2	74				
			4.2	74	11.1	196
d	0	0				
			3.4	39	8.9	102
e	3.4	39				
						3M = 535
						M = 178

Given: 4" Sch. 40 pipe, I=7.23, T=250 F

Eq. (22), $Z''=12eTL''$

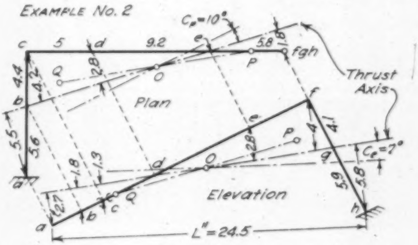
$$Z''=12\times0.00000625\times250\times22.4=0.422$$

Eq. (23), $F=\dfrac{\cos C Z'' EI}{1728M}$

$$F=\frac{0.996\times0.422\times29\times7.23}{1.728\times0.178}=287 \text{ (Test Value, F=322)}$$

Eq. (16), $S=\dfrac{6FY_{max}D''}{I}=\dfrac{6\times287\times5.3\times4.5}{7.23}=5680$

EXAMPLE No. 2



	Plan		Elevation		Sum of Squares	True Dist. from Thrust Axis		3M=L*(Y³)*/Y*			
	Y	Y²	Y	Y²		Y	Y³	Y*	(Y³)*	L*	3M
a	5.5	30	2.7	7.3	37.3	6.1	229				
								4.3	223	5.6	290
b	0	—	1.8	—	—	1.8	5.8				
								2.6	79	4.4	134
c	4.2	17.6	1.3	1.7	19.3	4.4	85				
								1.6	63	5	196
d	2.8	7.8	0	—	—	2.8	22				
						Use Equation 15, (3X7.8X9.2)					216
e	0	—	2.8	7.8	—	2.8	22				
								1.6	63	5.8	229
f	1.8	3.25	4	16	19.3	4.4	85				
								2.6	79	4.1	125
g	1.8	—	0	—	—	1.8	5.8				
								4.3	223	5.9	308
h	1.8	3.25	5.8	34	37.3	6.1	229				
											3M=1498
											M= 499

Given: 4" Sch. 40 pipe, I=7.23, Z"=4.05

Eq. 23, $F=\dfrac{Z''\cos C\,EI}{1728M}=\dfrac{4.05\times(0.993\times0.985)\times29\times7.23}{1.728\times0.499}$

F=968 (Test Value, F=1100)

Given: 6" Sch. 80 pipe, I=40.5, Z"=3.25

$$F=\frac{3.25\times(0.993\times0.985)\times29\times40.5}{1.728\times0.499}=4350$$

(Test Value, F=3900)

Note Cos C = (Cos Cp) (Cos Ce)

26) If the calculation is to be corrected for flattening effect, the value for *Lb* for each bend is calculated using the scale in Fig. 13 [page 95, December issue]. If weld elbows are used, the curves in Fig. 12 may be more convenient. Equation 24 [page 94, December] is solved to obtain the moment area of each bend separately. $Mb = Lb\ Yb^2$. These values of *Mb* are added to the value *M* previously calculated and equations 23 and 16 are solved using the new total value of *M* for the moment area.

It is usually not necessary to apply a flattening effect correction when figuring a three plane problem. Example 6, however, illustrates the type of problem where the flattening correction is very important.

Stress from Flattening of Pipe Bends

Until now, no mention has been made of the stress concentration produced in a pipe bend when it flattens. This concentration is caused by the fact that the bending stress is not distributed in the usual pattern. It is not a maximum at the outside fiber, but occurs in nearer the neutral axis, and it might be much higher than is indicated by equation 16 [on page 94, November issue].

The author has never been greatly concerned about the stress at this point, because it is highly localized. Flexing pipe bends are almost always made of ductile materials, and one need not be concerned about high localized stress in a ductile material, except where the pipe is frequently worked back and forth, producing many reversals of stress. Von Karman gives a multiplier, β, which may be applied to the stress obtained from equation 16, if one is concerned about this localized stress. No correction need be made if the value for *h* is greater than 0.80:

$$\beta = (0.667\ /\ K)\ \sqrt{0.332\ h^2 + 0.278} \quad \ldots\ldots\ldots\ldots\ldots\ldots [30]$$

Typical Examples Illustrate Method

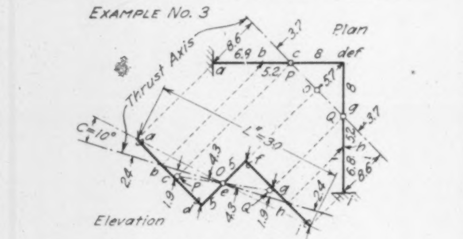
The first five of the accompanying examples were taken from a catalog. No calculated results are given in the catalog, but test results are given for each of these examples. It is therefore possible to compare the test results with the calculated results for each problem.

The test results are not necessarily more accurate than the calculation. Friction in the sliding anchor installed in the testing setup would tend to increase the test value of *F*. On the other hand, mechanical play in the slides might tend to decrease the test results. In any case, the agreement is good between the test and the calculated results, except for examples 1 and 3.

Symbols Used in This Article

- *C* is the angle between the thrust axis and a line joining the anchors.
- *Cp* is the angle *C* projected into the plan view.
- *Ce* is the angle *C* projected into the elevation view.
- *D* is the mean diameter of the pipe, in.
- *D''* is the outside diameter of the pipe, in.
- *dL* is the length of a very short element of pipe, ft.
- *e* is the coefficient of expansion of the material of which the pipe is made. (For steel, $e = 0.00000625$ per F).

EXAMPLE No. 3



	Plan		Elevation		Sum of Squares	True Dist. from Thrust Axis		$3M=L^*(Y^3)^*/Y^*$			
	Y	Y²	Y	Y²		Y	Y³	Y*	(Y³)*	L*	3M
a	8.6	74	2.4	5.7	79.7	8.95	720				
								5.2	669	6.8	872
b	3.7	—	0	—	—	3.7	51				
								1.8	44.1	5.2	129
c	0	—	1.9	—	—	1.9	6.9				
								5.2	353.1	8.0	541
d	5.7	32.3	4.3	18.5	50.8	7.1	360				
								1.4	175	5	625
e	5.7	—	0	—	—	5.7	185				
								1.4	175	5	625
f	5.7	32.3	4.3	18.5	50.8	7.1	360				
								5.2	353.1	8.0	541
g	0	—	1.9	—	—	1.9	6.9				
								1.8	44.1	5.2	129
h	3.7	—	0	—	—	3.7	51				
								5.2	669	6.8	872
i	8.6	74	2.4	5.7	79.7	8.95	720				
											3M=4334 M=1445

Given: 4" Sch. 40 pipe $I=7.23$, $Z''=5.52$

$$\text{Eq. 23, } F=\frac{Z''\cos C E I}{1728 M}=\frac{5.52\times 0.99\times 29\times 7.23}{1.728\times 1.445}$$

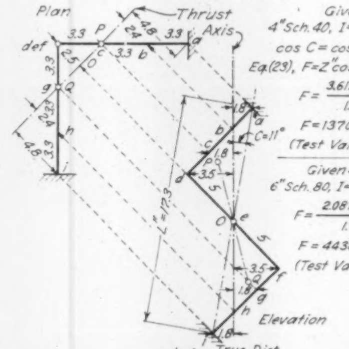
$F=458$ (Test Value $F=1000$)

Given: 6" Sch 80 pipe $I=40.5$, $Z''=4.47$

$$F=\frac{4.47\times 0.99\times 29\times 40.5}{1.728\times 1.445}=2090$$

(Test Value $F=4300$)

EXAMPLE No. 4



Given:
4" Sch. 40, $I=7.23$, $Z''=3.61$
$\cos C=\cos 11°=0.98$
Eq.(23), $F=Z''\cos C E I/1728 M$

$$F=\frac{3.61\times 0.98\times 29\times 7.23}{1.728\times 0.313}$$

$F=1370$
(Test Value, $F=1300$)

Given:
6" Sch. 80, $I=40.5$, $Z''=2.08$

$$F=\frac{2.08\times 0.98\times 29\times 40.5}{1.728\times 0.313}$$

$F=4430$
(Test Value, $F=3600$)

	Plan		Elevation		Sum of Squares	True Dist. from Thrust Axis		$3M=L^*(Y^3)^*/Y^*$			
	Y	Y²	Y	Y²		Y	Y³	Y*	(Y³)*	L*	3M
a	4.8	23.0	1.8	3.25	26.3	5.13	135				
								2.7	121	3.3	148
b	2.4	—	0	—	—	2.4	13.9				
								0.6	8.1	3.3	44.5
c	0	—	1.8	—	—	1.8	5.8				
								2.5	74.2	3.3	98.5
d	2.5	6.25	3.5	12.2	18.5	4.3	80				
								1.8	64.4	5.0	179
e	2.5	—	0	—	—	2.5	15.6				
								1.8	64.4	5.0	179
f	2.5	6.25	3.5	12.2	18.5	4.3	80				
								2.5	74.2	3.3	98.5
g	0	—	1.8	—	—	1.8	5.8				
								0.6	8.1	3.3	44.5
h	2.4	—	0	—	—	2.4	13.9				
								2.7	121	3.3	148
i	4.8	23.0	1.8	3.25	26.3	5.13	135				
											3M=940 M=313

E is the modulus of elasticity of the material in the pipe, psi. For steel, E = 29,000,000 psi. This value decreases as the temperature rises, but the value for e increases with rise in temperature. These two terms are always multiplied together, so that no correction for changes in temperature need be made for steel for all temperatures below 600 F.

F is the force applied to the rigid arm to simulate the effect of anchoring the pipe.

h is a constant $= 4\,t\,R\,/\,D^2$

I is the moment of inertia of the pipe cross-section, in.^{4}

K is a constant $= (1 + 12h^2)/(10 + 12h^2)$

L'' is the true distance between anchors, ft.

L^* is the length of straight pipe between two reference points, ft.

Lb is the net equivalent length of a pipe bend, ft.

M is the moment area, ft^3. $M = \int Y^2\,dL$

Mb is the moment area added by flattening effect at a pipe bend, ft^3. It is the net increase in moment area over that already included in a square corner assumption.

R is the radius of the centerline of a pipe bend, in.

S is the maximum bending stress in the pipe caused by thermal expansion.

T is the difference between the operating temperature and the temperature at which the pipe is installed, deg Fahr.

t is the wall thickness of the pipe, in.

Y is the perpendicular distance from the element of pipe dL to the thrust axis, ft.

Y^* is the arithmetic difference between two successive values of Y. It is always taken as plus.

$(Y^3)^*$ is the difference between the cubes of successive values of Y. Note that it is not the cube of the difference.

Yb is the distance from the center of gravity of a pipe bend to the thrust axis.

Z is the deflection of the rigid arm parallel to thrust axis, in.

Z' is the deflection of the rigid arm measured perpendicular to the thrust axis, in.

Z'' is the vector sum of Z and Z', in.

β is a stress multiplier to correct for the concentration of stress which occurs when a pipe bend flattens.

URGES MODERNIZATION OF MIDDLE-AGE HOTELS

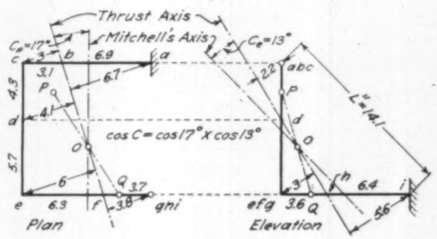
Owners of middle-aged hotels can increase the efficiency and economy of operation and, in turn, occupancy in the older buildings through remodeling and modernization, according to Tom McDonald, vice president of the Minneapolis-Honeywell Regulator Co.

"By removing stone balustrades in favor of contemporary lines, revamping and rearranging interior layout, removing partition walls, installing up-to-date air conditioning, heating, plumbing and lighting facilities, improving elevator service, and by redesigning lobbies, entrances and public rooms, it is possible to substitute a virtually new, modern building for the older one," according to Mr. McDonald.

Unequal heat distribution is one of the problems affecting guest comfort and mushrooming management expenses. Many hotels, Mr. McDonald said, waste heat on the sunny side to provide comfort on the shady side. This lopsided arrangement of heating can be corrected with a few simple changes in the heating system and the addition of proper control equipment.

EXAMPLE No. 5

Given: 4" Sch 40 Pipe, $I = 7.23$, $Z'' = 8.08$

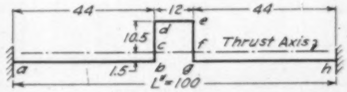


	Plan Y	Plan Y²	Elevation Y	Elevation Y²	Sum of Squares	True Dist. from Thrust Axis Y	True Dist. from Thrust Axis Y³	3M=L*(Y³)*/Y* Y*	(Y³)*	L*	3M
a	6.7	45	2.2	4.84	49.8	7.05	350				
								4.8	339.4	6.9	486
b	0	0	2.2	4.84	4.84	2.2	10.6				
								1.5	40	3.1	83
c	3.0	9	2.2	4.84	13.8	3.71	51				
								0.4	18	4.3	193
d	4.1	16.8	0	0	16.8	4.1	69				
								2.6	232	5.7	511
e	6.0	36	3	9	45.0	6.71	301				
								3.7	274	6.3	466
f	0	0	3	9	9	3	27				
								1.9	88	3.7	171
g	3.8	14.6	3	9	23.6	4.86	115				
								1.04	59	3.6	204
h	3.8	14.6	0	0	14.6	3.82	56				
								2.95	255	6.4	551
i	3.8	14.6	5.6	31.4	46.0	6.77	311				
											3M=2665
											M= 888

$$F = \frac{Z'' \times \cos C\, EI}{1728M} = \frac{8.08(0.956 \times 0.975) \times 29 \times 7.23}{1.728 \times 0.888} = 1030$$

(Test Value, F=1000)

EXAMPLE No. 6



$D'' = 24 \quad t = 0.375 \quad I = 1942 \quad T = 212F \quad C = 0$

$R = 1.5D = 36$

$Z'' = 12\,e\,TL'' = 12 \times 0.00000625 \times 212 \times 100 = 1.58$

From Fig. 12, $L_b = 36$ Eq. 15, $M = Y^2L^*$

Eq. 14, $M = (Y^3)^*L^*/3Y^*$

	Y	Y²	Y³	L*	(Y³)*	Y*	M	Equation
a	1.5							
		2.25		44			100	15
b	1.5	2.25	3.38	(L_b=36)			81	24
				1.5	3.38	1.5	1	14
c	0		0					
				10.5	1160.	10.5	387	14
d	10.5	110	1160	(L_b=36)			395	24
		110		12			132	15
e	10.5	110	1160	(L_b=36)			395	24
				10.5	1160.	10.5	387	14
f	0		0					
				1.5	3.38	1.5	1	14
g	1.5	2.25	3.38	(L_b=36)			81	24
		2.25		44			100	15
h	1.5							
							M=2060	

Eq. 23, $F = \dfrac{\cos C Z'' EI}{1728M}$

$$F = \frac{1 \times 1.58 \times 29 \times 1942}{1.728 \times 2.06} = 25{,}100 \text{ pounds}$$

Eq. 16, $S = \dfrac{6FY_{max}D''}{I} = \dfrac{6 \times 25{,}100 \times 10.5 \times 24}{1942}$

$S = 19{,}500$ psi

The above values for stress and thrust may be reduced by $\frac{1}{3}$ if cold spring is applied.

Four Techniques Used to Insulate Hospital Piping

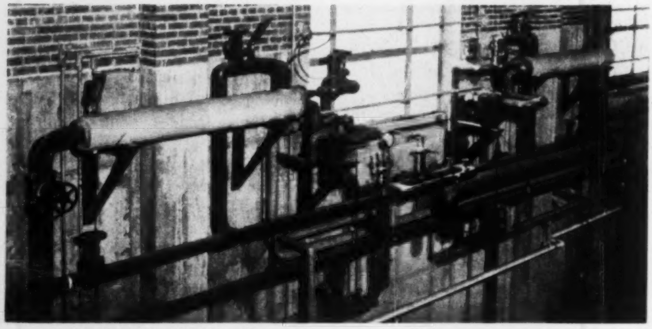


FIG. 1—UP TO 4 IN. diameter, piping is insulated with a single layer of mineral wool molded type insulation

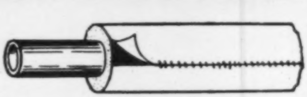


FIG. 2—SINGLE LAYER application of sectional pipe insulation, used on piping of size shown in Fig. 1

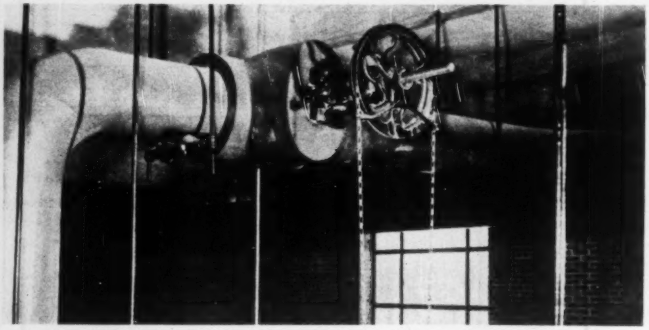


FIG. 3—LARGER PIPING is insulated with the double layer method. Bearing plates are used at pipe hangers

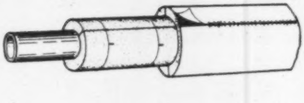


FIG. 4—DOUBLE LAYER method of applying sectional pipe insulation, as used on larger piping shown in Fig. 3

Table 1—Recommended thicknesses of mineral wool molded type pipe insulation for temperatures up to 600 F

Temperature, F	Thickness, in. Pipes below 2 in.	Pipes 2 in. to 4 in.	Pipes 4 in. to 12 in.
Up to 275	1	1	1
275 to 350	1	1	1½
350 to 425	1	1½	2
425 to 500	1½	2	2½†
500 to 600	2	2†	2½†

†Double layer (each layer one-half the total thickness)

EACH PIPE, BEND and flange at the new $18 million, 14 story, 2300 room VA hospital in Buffalo, N. Y., is carefully insulated to prevent heat loss, and increase efficiency, or to prevent condensation on cold lines. The piping is also color-coded so that the operating engineers and maintenance crew can determine quickly what each piping system carries and what equipment it serves. Green indicates feedwater; orange, condensate; red, steam; and bright red, steam exhaust.

Four different techniques were used to insulate the power room piping.

Piping up to 4 in. in diameter, such as that shown in Fig. 1, is insulated with a single layer of mineral wool molded type pipe insulation. The insulation is bound in place with galvanized wire, covered first with rosin paper and next with 8 oz canvas sewed in place, given a coat of sizing and finally painted in accordance with the color code. In Fig. 1 the black pipes carry fuel oil to heat exchangers, the heat exchangers themselves being insulated with molded mineral wool insulation. Fig. 2 indicates the steps taken to insulate piping by this "single layer" method.

The larger diameter pipe (12 in.) shown in Fig. 3 in insulated by the "double layer" method, the technique being illustrated in Fig. 4. The second layer is applied over the first layer, joints being staggered so as not to present a continuous path for heat leakage, and finished as in the "single layer" technique. Recommended* insulation thicknesses for both "single layer" and "double layer" applications are given in Table 1.

Fig. 3 also illustrates a pipe hanger which allows the pipe to expand or

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*Commercial Standard CS117-49, Mineral Wool Insulation for Heated Industrial Equipment. Individual copies are available free of charge from the Industrial Mineral Wool Institute, 441 Lexington Ave., New York 17, N.Y.

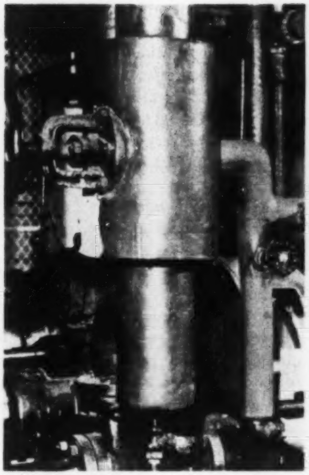


FIG. 5—VALVES, FLANGES and fittings are insulated by cutting and notching molded pipe sections to fit the contours

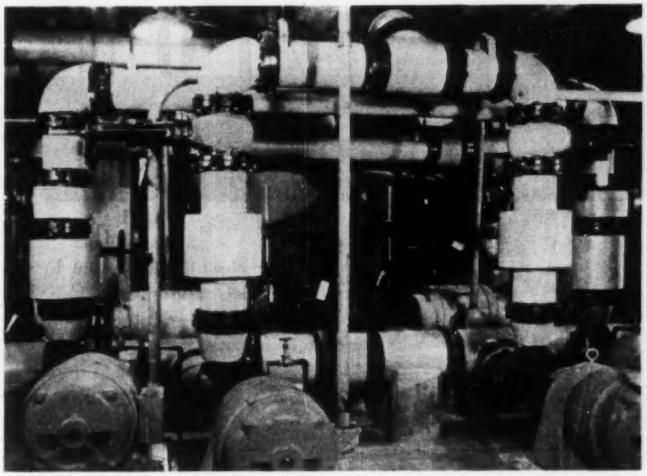


FIG. 7—SWEATING IS prevented on this cold piping in the pump room of the hospital by thorough insulation

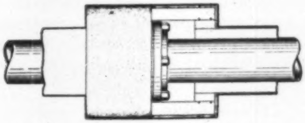


FIG. 6—APPLICATION OF molded mineral wool insulation to flanges and fittings such as illustrated in Fig. 5

contract without dislodging the support. The pipe hanger is a trapeze type, the bar of which is concaved to fit the cylindrical contour of the pipe. Sections of heavy gage sheet metal are used as bearing plates at pipe hanger locations.

Skillful insulation of the protruding sections of the valve is also shown in Fig. 3. Large valves, flanges and fittings of this type, and of the type shown in Fig. 5, are insulated by cutting and notching mineral wool molded pipe sections to fit their contours; Fig. 6 illustrates this technique.

The turbine beneath the valve in Fig. 5 is also insulated with mineral wool. Insulating cement is applied directly to the turbine surface and built up in $\frac{1}{4}$ in. layers to a total thickness of $1\frac{1}{2}$ in. The mineral wool cement is coated with a layer of finishing cement and then housed in a protective sheet metal covering.

Pipe bends and connections are insulated by building up thicknesses of mineral wool insulating cement equal to the adjacent sectional insulation. The cement thickness is built up in $\frac{1}{4}$ in. layers to permit thorough drying of each layer before application of subsequent layers and sizing, canvas, and paint.

An interesting application of insulation to prevent sweating is shown in Fig. 7. This photo shows the pump room, from which cold water is pumped throughout the hospital.

Although this discussion deals only with the techniques used to insulate pipes, equal care was taken to insulate other units. No equipment which was too hot to touch was left uninsulated.

VOLATILE RESTRICTIONS NOT ANSWER TO SMOKE

TEN CITIES have volatile restrictions on coal used in certain types of equipment but substitution of low volatile coal for higher volatile bituminous coal is not the answer to abatement of smoke in all cities concerned with the problem, according to Dr. Louis C. McCabe, chief of the office of air and stream pollution control of the U. S. Bureau of Mines, at the annual meeting of the Stoker Manufacturers Association. Most of the smokeless coals are coking coals or have qualities which make them desirable for blending with coking coal to extend the life of these important natural resources.

While there is no current limit to the availability of low volatile coal, other than that set by supply and demand, it is in the national interest that this important body of coal be conserved to the greatest extent possible for extending our coking coal reserves, he said. There are a few fuels, such as anthracite, coke and gas, that can be burned smokelessly in most any type of furnace, but anthracite and coke are not available in some highly competitive fuel markets.

Any fuel can be burned smokelessly, he remarked. The first requirement is that the equipment must be designed for the fuel used.

It is becoming more widely recognized that much of the contamination of an industrial atmosphere is caused by dust, fumes and gases which are not related to the processes of combustion. Such emissions are usually a functional part of the plant operation, and better design and careful operation rarely can prevent these emissions. When dusts, fumes and gases are an integral part of a process, mechanical equipment must be designed to remove these emissions, he said.

QUESTION *of the Month*

Questions on heating, piping and air conditioning asked by HPAC's readers are answered here each month. We hope you find these practical comments of regular interest, and will contribute either a question or an answer to a published question on occasion. Address the Editor, Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Illinois

How Does Radiant Heating Affect Hardwood Floors?

A CONTRACTOR reader of HPAC recently asked for information on installing a radiant heating system under hardwood floors. He has installed such systems in concrete floors but never with hardwood floors, and the owner has asked him about possible damage to the flooring.

This question was submitted to Paul S. Park, Jr., who has written a number of articles on floor type radiant heating installations for these pages, his most recent being a discussion of the effect of floor heating in schools, published in the November HPAC.

Mr. Park's comments on this question are given in the following paragraphs.

ONE OF THE MOST difficult design problems in the field of radiant heating involves the use of piping in an air space beneath hardwood flooring. My experience indicates that there are at least three phases to the problem, all of which must be understood and properly evaluated if a satisfactory installation is to result. These phases are, (1) effect of the heating pipes on the wood flooring (2) insulating effect of the air space and wood flooring and (3) support of the piping to prevent expansion and contraction noise. These factors combine to form a complex engineering problem and quite frequently the solution is considered so difficult or uncertain that the decision is reached to use a ceiling type radiant system. While a ceiling system also requires careful and competent engineering, such systems are quite numerous now and the design and installation problems encountered are more easily solved. Sometimes, however, ceiling construction or materials rule out a ceiling system and, since wall systems are not normally practicable, there is no alternative but to work out a floor type installation.

While the number of installations involving wood flooring is relatively small, particularly those in wood joist construction, a great deal of research on systems of this type has been done by both commercial and noncommercial interests. Most of the study regarding the first phase of the problem—the effect of the heating pipes on wood flooring—has centered around wood flooring placed on or immediately above concrete floors. One reason for this situation is that some damage to wood flooring placed above concrete occurred with earlier installations, while with wood joist construction the flooring was considerably less affected. Some wood flooring over heated concrete was practically unaffected, but both shrinkage and buckling were reported in other cases. The studies and research that were conducted resulted in the development of the following recommendations:

1) Provide adequate drainage away from the structure.

2) Install a waterproofing membrane of double thickness below the concrete slab.

3) Use flooring dried uniformly to a moisture content adapted to the climate in which it will be used. Information is available from Forests Products Laboratory, Forest Service, U. S. Department of Agriculture.

4) Do not deliver flooring to the structure until the concrete and plaster are thoroughly dry.

5) Do not lay flooring until radiant heating system has operated for 72 hr at design water temperature.

6) Do not permit rain or snow to enter structure after heating system has operated or after flooring has been laid.

These precautions should prevent both the cracks which result from the drying out of flooring having an excessive initial moisture content and the buckling which results from the flooring absorbing the moisture from uncured concrete, plaster or other sources. Where concrete floors are not involved, points 1, 3, 4 and 6 are still pertinent and, in addition, where a full basement does not exist a moisture barrier on the underside of wood joists would be considered desirable.

The second phase of the problem of designing a radiant heating system in wood joist construction concerns the difficulty of forcing heat from one air space to another through a double wood floor. Some theoretical data are available from a number of sources, including T. Napier Adlam's book Radiant Heating, which indicate that when the heating load in a given room exceeds 40 Btu per hr per sq ft of floor surface, excessive water temperatures (above 180 F) may be required. Practical data available from various sources, as well as my own experience, will reveal instances where systems calculated to provide a heat output of 60 Btu have been successful using a water temperature as low as

145 F. Here again the "calculated load" is undoubtedly higher than the theoretical or the actual load and experience is the only basis which will enable the selection of a safe but economical and realistic limit. For example, I have had first hand experience with an installation about 20 miles from Pittsburgh which was completed in 1945; 1-¼ in. wrought iron pipe spaced from 8-½ to 12 in. on centers was hung from 2 × 8 joists on which conventional subflooring and hardwood finish flooring had been installed.

After the pipes had been positioned, 2 × 4's were nailed on edge to the bottom of the joists, between the pipes. Other 2 × 4's then were fastened flat to the bottom edges to form sleepers. This left an air space of 12 in. between the subflooring and the sleepers.

A layer of aluminum-coated insulating paper was tacked on top of the sleepers and another layer of the same material was placed on the bottom, creating a 2 in. air space between the insulation paper. Finally, ¾ in. semi-rigid insulation board was nailed to the underside of the sleepers in direct contact with the aluminum-coated paper. This formed a solid ceiling for the basement.

Despite below zero temperatures, when the heating load in the individual rooms ranged from 40 to 60 Btu per hr per sq ft of floor area, the owner reports conditions as comfortably warm at all times with a maximum mean water temperature of 140 F. The owner also reports that a very small and unobjectionable degree of shrinkage occurred with the oak flooring. It is interesting to note that due to difficulty in procuring heating equipment, this building was completed for over a year before the heating system was installed. Thus the plaster and other materials had an opportunity to dry and thereby permit the flooring to reach a stable point with regard to moisture content. On the other hand, the absence of heat for such a long period of time might also be conducive to a higher moisture content than the flooring would have otherwise contained.

While experience can provide some helpful data regarding coils in an air space, from a theoretical standpoint, the use of copper tubing normally purchased for heating work would be considered questionable for this type of application. In radiant heating work, the heat transfer characteristics of ferrous and nonferrous materials are relatively unimportant when the piping is embedded in concrete or plaster. But when the heating pipes are suspended in air, the characteristic known as emissivity becomes quite important.

Regardless of the piping material used the following design factors must also be considered and evaluated:

1) Place pipes in as small and airtight a space as possible.
2) Floor coverings on top of wood flooring should be selected to cover as little floor area as possible and should not greatly increase the heat transfer problem.
3) Insulating barrier beneath piping should be carefully selected and installed to restrict downward heat flow to not more than 10 percent.

The third and final phase of the problem concerns provisions for minimizing or preventing noises from expansion and contraction of the piping. With pipes supported from the bottom of wood joists, the important consideration seems to be to provide at least ⅛ in. clearance between the pipe and joists. With piping on top of joists, the use of metal shims between pipe and wood has been recommended. Other practices in either case may be as good or better than those given, but they have not come to my attention.

In conclusion, it should be recognized that it is difficult to present a general procedure which can be adapted, without variation, to a number of specific situations. Consequently, if any particular questions in the case of an individual installation are left unanswered by the information given, I shall appreciate the opportunity to present any additional specific information that may be requested.—Paul S. Park, Jr., associated with C. A. Hawk, Jr., consulting engineer.

ENGINEER ASKS DATA ON STORE ENTRANCE VENTILATION

You are *invited to answer the following question, which has been submitted by a reader of* HPAC. *Suitable comment on the matter will be welcomed and—space permitting—will be published. Address your reply to the Editor, Heating Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2.*

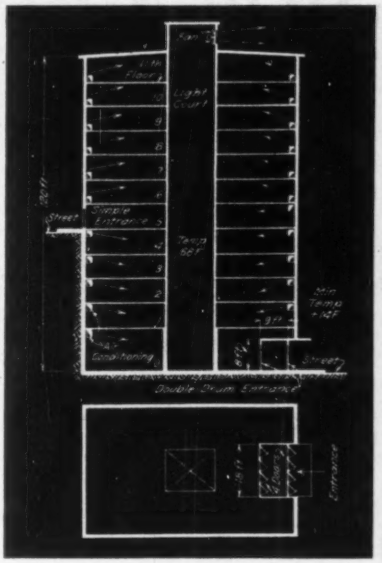
"I would like some information on the ventilation of a big store entrance of the "double-drum" type as indicated in the accompanying sketch. I am in particular need of data on the following points:

"a) How is it possible to prevent the entrance of outdoor air?

"b) What is the required amount and temperature of the air to deliver in such cases?

"c) Where can I obtain published articles or other data on such installations?

"Any assistance on these questions from other readers of HPAC would be most appreciated."—R. G.



"R. G." WOULD LIKE information on the ventilation of the entrance to an air conditioned store, as sketched here

Sam Lewis' Page

INFORMAL COMMENT on heating, piping and air conditioning matters is given in this regular feature by Samuel R. Lewis, consulting mechanical engineer, and a member of HPAC's board of consulting and contributing editors.

SOME NOTES FROM MY BOOK OF EXPERIENCE

I KEEP TRYING to develop notes for procedure, based on my own consulting engineering experiences, that will agitate my own memory, and that may help to educate my staff members.

Some of them are as follows:

1) A spray for distributing liquid generally is preferable to a "drool". Some compressed air, sensibly combined with a liquid, may far surpass the efficiency, for example, of an overflowing trough or of needle-holes in distributing water in numerous applications.

2) Sewage pumps, as for basement drainage, generally should be in duplicate, with an automatic electric alternator so that each pump takes its turn in being the first one to run. Condensate pumps for clear water may be single or duplex, but generally it seems unnecessary to provide automatic electric alternator control for such pumps.

3) Air supply and exhaust air ducts in modern large buildings may have extensive horizontal runs, yet may be too small for entry by men for cleaning. The necessity for repeated cleaning of such ducts must not be forgotten, and there should be an adequate number of access openings provided for this purpose.

4) The outlet for spent air from any building or department should face in such a direction that the wind cannot obstruct the air flow. This means that the outlet should look up. Tests have proved that no cowl or hood interposes less resistance to air flow than does an open, uplooking terminal. Rain and snow can be cared for by an offset and a drain, or by a cap that leaves air passage open on all sides.

A gooseneck can be tolerated as an intake above a roof, but is entirely to be avoided as an outlet, since wind pressure against the outlet may nullify its service.

5) I have no record of a water-cooled heat transfer coil in an air conditioning plant that did not freeze or fail to be ruined if the designer neglected to protect it by heat on the air intake side of the coil.

6) One big air conditioning job had dampers arranged so that when the exhaust fan was throttled, a proportion of the air intended to be removed by this fan could flow to the suction side of the tempering coils that served the supply fan. This permitted some economy in quick heating or cooling prior to occupancy and worked satisfactorily for six years.

I received a report that something had gone wrong and that it had been so acting for several months.

I found that the interlocked damper arrangements had failed, to the extent that the exhaust fan was drawing filtered outside air through the former recirculating air damper and was throwing this air directly back out of doors. The exhaust fan thus was competing with the supply fan for air supply.

I changed the ducts immediately so that the exhaust fan outlet, rather than its inlet, communicates with the supply fan suction chamber. This experience leads me to view with suspicion any alleged air conditioning system that gives a single supply fan a chance to take part of its air from the suction side of the exhaust system.

7) Frequently we hear of single-pipe steam heating radiators that do not drain and do not vent, so that the radiators near the remote ends of the mains fill with condensate.

In some cases the trouble is due to insufficient height above the water level in the boiler. The tee that is supposed to pass steam and water in opposite directions through a branch to the radiator must be able to receive steam from the top of the main and to return condensate to the bottom of the same main.

Usually the remedy for poor original design is to raise the steam main or to lower the boiler, or to install a condensate pump with a separate return pipe from the pump back to the boiler.

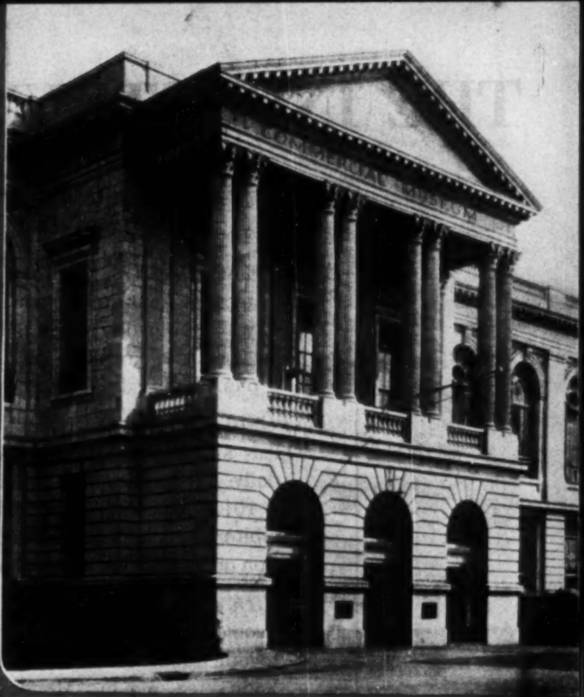
8) Electrostatic air cleaners of the parallel plate type will agglomerate fine dust. They are *not* sieves, so that if no one cleans them the chunks of dust eventually must fall off and will be delivered into the rooms.

For this reason a second filter should be placed to leeward of such electrostatic filters. This second filter should be of a type that will catch the chunks of dust and that if uncleaned, ultimately will become so clogged as to advertise its inability to pass the air.

9) Low pressure steam mains should have sediment pockets and drain traps at their ends. The end of the steam main should be into the side of a tee, and the sediment pocket should be on the bottom of this tee. The more nearly the diameter of the sediment chamber approaches the diameter of the steam main, the better. Frequent noise troubles attend attempts to drain steam mains through down-looking tees that are ahead of the ends of the mains.

10) A large single-pipe steam heating system was to undergo partial face-lifting by having automatic regulating valves installed.

The runouts from the risers to the radiators were above the floor. The contractor placed the pneumatic valves in these horizontal branches, and used globe valves, with their stems vertical. Of course, the steam on its way to the radiator, and the condensate on its way back, hated to pass each other through the globe valve, which when placed in this position, formed a dam to keep half of the runout pipe full of water. The contractor had to turn all of the globe valves so that their stems were horizontal.



10th International Heating, Ventilating & Air Conditioning Exposition

SHOW SECTION

57th Annual Meeting of the American Society of Heating and Ventilating Engineers

PHILADELPHIA
January 22-26

THE INDUSTRY'S "BIG WEEK"

The Quick Picture

ASHVE MEETING . . . .

Technical sessions at 9:30 a.m. Monday, Tuesday, Wednesday and Thursday at the Bellevue-Stratford. Afternoon sessions at Convention Hall at 2:30 p.m. Tuesday and 2 p.m. Wednesday. See program for full information.

EXPOSITION . . . .

Opens Monday at 2 p.m. in the Commercial Museum, and daily Tuesday through Friday at 12 noon. Closing hour is 10:00 p.m., except on Friday at 6 p.m. See list of exhibitors and diagram of exhibit building for full information on "who, what and where."

ON THE LIGHTER SIDE . . . .

Welcome tea, 4 p.m., Sunday, Bellevue-Stratford. Get-together luncheon, 12:15, Monday, Bellevue-Stratford. Ladies tea, 3 p.m., Monday, John Wanamaker's. Informal party and buffet supper, 7 p.m., Monday, Hotel Benjamin Franklin. Ladies "brunch", 10:30 a.m., Tuesday, Warwick Hotel, followed by bus tour of historic spots at 11:00 a.m. Luncheon and fashion show, 12:30 p.m., Wednesday, Warwick Hotel. Annual banquet, 7 p.m., Wednesday, Bellevue-Stratford. Bus trip to Atlantic City for ladies, leaving Bellevue-Stratford at 10:30 a.m., and Benjamin Franklin at 10:35, Thursday.

PROGRAM FOR ASHVE's 57TH ANNUAL MEETING

Saturday—January 20

10:00 a.m. Committee on Research, R. C. Cross, *Chairman* (Bellevue-Stratford—*Green Room*)

1:30 p.m. Executive Committee of Council (Bellevue-Stratford—*Room* 108)

Sunday—January 21

10:00 a.m. REGISTRATION (Bellevue-Stratford—*Oak Room*)

10:00 a.m. Council Meeting (Bellevue-Stratford—*Green Room*)

12:15 p.m. Admission and Advancement Committee Luncheon (Bellevue-Stratford—*Room* 104)

4:00 p.m. Committee on Research (Bellevue-Stratford—*Room* 108)

4:00 p.m. Welcome Tea (Bellevue-Stratford—*North Garden* and *Foyer*)

Hostesses: Mmes. A. J. Nesbitt, F. H. Buzzard, E. H. Dafter, M. G. Kershaw, J. W. McElgin, E. K. Wagner

Monday—January 22

9:00 a.m. REGISTRATION (Bellevue-Stratford—*Oak Room*)

9:30 a.m. FIRST SESSION (Bellevue-Stratford—*Rose Garden*)
Pres. Lester T. Avery presiding
Welcome to Philadelphia
Response by President Avery
Reports of Officers and Council
Losses from a Floor-Type Panel Heating System, by F. W. Hutchinson, D. L. Mills and L. J. La Tart
Operating Experience and Data from Sidewalk Snow-Melting System, by L. A. Stevens and G. D. Winans
Analysis of Air and Panel Cooling Systems, by Charles S. Leopold

12:15 p.m. GET-TOGETHER LUNCHEON (Bellevue-Stratford—*Ballroom*)

Speaker: Dr. Lillian M. Gilbreth. Subject: Management Problems in the Home

2:00 p.m. EXPOSITION—Opening of 10th International Heating and Ventilating Exposition (Commercial Museum)

Exhibit will open daily from 12 noon to 10:00 p.m., Tuesday to Thursday, and will close at 6:00 p.m. on Friday
ASHVE Booth No. 88

2:00 p.m. Chapters' Conference Committee—B. L. Evans, *Chairman* (Bellevue-Stratford—*Junior Room*)

2:00 p.m. TAC on Air Distribution, Ernest Szekely, *Chairman* (Bellevue-Stratford—*Room* 104)

2:00 p.m. TAC on Combustion, T. H. Smoot, *Chairman* (Bellevue-Stratford—*Room* 108)

2:00 p.m. TAC on Cooling Load, W. E. Zieber, *Chairman* (Bellevue-Stratford—*Room* 105)

2:00 p.m. TAC on Panel Heating and Cooling, P. B. Gordon, *Chairman* and Group A, A. B. Algren, *Chairman* (Bellevue-Stratford—*Green Room*)

3:00 p.m. Ladies Tea with Entertainment
John Wanamaker's (*Greek Room*)
Hostesses: Mmes. A. J. Nesbitt, F. H. Buzzard, E. H. Dafter, M. G. Kershaw, J. W. McElgin, E. K. Wagner

4:00 p.m. TAC on Weather Design Conditions, W. M. Wallace, II, *Chairman* (Bellevue-Stratford—*Blue Room*)

7:00 p.m. TAC on Combustion, T. H. Smoot, *Chairman* (Bellevue-Stratford—*Room* 104)

7:00 p.m. to 12:00 p.m. "A Night with the Pennsylvania Dutch" (Hotel Benjamin Franklin—*Ballroom*)
Hot supper, buffet style, Pennsylvania Dutch dishes served from 7:00 p.m. to 12:00 p.m. in adjoining *Betsy Ross* and *Franklin Rooms*

8:30 p.m. "Papa Is All" (Pennsylvania Dutch Play)

10:00 p.m. Dancing (including square dancing with up-state Dutch old time caller)

12:00 p.m. Special entertainment
DON'T MISS THE SWAP SHOP: Bring a gimmick to swap for ????? We Dutch are sharp traders

Tuesday—January 23

8:30 a.m. TAC on the Heat Pump, R. C. Jordan, *Chairman* (Bellevue-Stratford—*Room* 107)

9:00 a.m. REGISTRATION (Bellevue-Stratford—*Oak Room*)

9:30 a.m. TECHNICAL SESSION (Bellevue-Stratford—*Rose Garden*) First Vice Pres. Lauren E. Seeley presiding
Report of Tellers of Election
The Efficiency of Bituminous Coal-Burning Space Heaters, by J. W. Tieman and F. L. Bagby
The Measurement of Smoke, by K. O. Beatty, Jr. and James E. Deas, Jr.
Report of Committee on Research—R. C. Cross, *Chairman*
Rating of Fuel Oils by a Test Unit, by D. W. Locklin and G. V. Parmelee
*Smoke Measurement in a Fuel Oil Test Unit, by D. W. Locklin and G. V. Parmelee

9:30 a.m. TAC on Industrial Ventilation, W. N. Witheridge, *Chairman* (Bellevue-Stratford—*Room* 108)

9:30 a.m. TAC on Sensations of Comfort, C. S. Leopold, *Chairman* (Bellevue-Stratford)

10:30 a.m. Ladies "Brunch" (Warwick Hotel)
Hostesses: Mmes. M. F. Blankin, W. P. Culbert, H. B. Hedges, C. F. Dietz, J. H. Hucker, R. F. Hunger, J. O. Kirkbride, H. H. Mather, R. D. Touton

11:00 a.m. Bus Tour of "Old and New Philadelphia and Historic Valley Forge"
Lv. from Warwick Hotel—Stops at Independence Hall, Betsy Ross House, The Chapel at Valley Forge, and Washington's Headquarters. Bus returns at 4:30 p.m.

12:15 p.m. Guide Committee Luncheon (Bellevue-Stratford—*Pink Room*)

12:15 p.m. Luncheon Meeting—TAC on Hot Water and Steam Heating, J. W. James, *Chairman* (Bellevue-Stratford—*Room* 105)

2:30 p.m. TECHNICAL SESSION (Convention Hall) Second Vice Pres. Ernest Szekely presiding
A Survey of Electrostatic Precipitation, by E. A. Walker and J. E. Coolidge
Theory of Earth Heat Exchangers for the Heat Pump, by L. R. Ingersoll, F. T. Adler, H. J. Plass, and A. C. Ingersoll
Factors Useful in Ground Grid Design for Heat Pumps, by George S. Smith

2:30 p.m. TAC on Heating Load, A. I. Brown, *Chairman* (Convention Hall)

2:30 p.m. TAC on Sorbents, John Everetts, Jr., *Chairman* (Convention Hall)

4:30 p.m. Committee on Research (Convention Hall)

7:00 p.m. Past Presidents' Dinner (The Union League, Broad and Sansom Sts.)

Wednesday—January 24

8:00 a.m. Breakfast Meeting—TAC on Panel Heating and Cooling—Group D, J. S. Locke, *Chairman* (Bellevue-Stratford—*Room* 107)

9:00 a.m. REGISTRATION (Bellevue-Stratford—*Oak Room*)

9:30 a.m. TECHNICAL SESSION (Bellevue-Stratford—*Rose Garden*) Pres. Lester T. Avery presiding
Symposium—Nathaniel Glickman, Moderator
Subject: "Man and His Relationship to Air"
Speakers: Dr. Eugene F. DuBois, Dr. Robert W. Keeton, Charles S. Leopold, Capt. Oscar Schneider, and Prof. Theodore Hatch

9:30 a.m. TAC on Heat Flow through Glass, R. A. Miller, *Chairman* (Bellevue-Stratford—*Room* 104)

9:30 a.m. TAC on Insulation, M. W. Keyes, *Chairman* (Bellevue-Stratford—*Room* 105)

12:30 p.m. Luncheon and Fashion Show (Warwick Hotel)
Hostesses. Mmes. C. S. Leopold, M. E. Barnard, L. M. Church, John Everetts Jr., J. H. Hucker, L. E. Moody, Ludwig Mack, W. S. Scott

12:15 p.m. Nominating Committee Meeting (Bellevue-Stratford—*Blue Room*)

2:00 p.m. TECHNICAL SESSION (Convention Hall) First Vice Pres. Lauren E. Seeley presiding
Field Studies of Heat Losses from Concrete Floor Panels, by C. M. Humphreys, C. V. Franks and L. F. Schutrum
Principles of Effective Heat for Steam Heated Structures, by C. O. Mackey, N. R. Gay, R. D. Tutt, E. G. Powell and E. L. Broderick
Transportation Heating and Air Conditioning Systems and Controls, by N. O. Kirkby
*Water-Vapor Permeability of Building Papers and Other Sheet Materials, by E. R. Bell, M. G. Seidl and N. T. Krueger

7:00 p.m. ANNUAL BANQUET (Bellevue-Stratford—*Ballroom*)
Toastmaster: Merrill F. Blankin, past president of ASHVE
Presentation of Past President's Emblem to Lester T. Avery

Thursday—January 25

9:00 a.m. REGISTRATION (Bellevue-Stratford—*Oak Room*)

9:30 a.m. TECHNICAL SESSION (Bellevue-Stratford—*Rose Garden*) Treas. Reg F. Taylor presiding
Use of Aircraft Propellers for Axial Flow Fans, by E. C. Lundquist and M. J. Hamilton
Roof Spray for Reduction in Transmitted Solar Radiation, by G. E. Sutton
Solar Energy Transmittance of Figured Rolled Glass, by G. V. Parmelee and W. W. Aubele
Installation of Officers
Unfinished Business
New Business
Resolutions
Adjournment

10:30 a.m. Ladies Bus Trip to Atlantic City
Lv. Bellevue-Stratford at 10:30 a.m.
Lv. Benjamin Franklin at 10:35 a.m.
Luncheon at Captain Starns
Lv. Atlantic City at 4:00 p.m.
Ar. Philadelphia 6:00 p.m.

12 noon Committee on Research Luncheon (Bellevue-Stratford—*Blue Room*)

12:30 p.m. Council Luncheon Meeting (Bellevue-Stratford—*Pink Room*)

Friday—January 26

12:00 p.m. EXPOSITION—10th International Heating and Ventilating Exposition (Commercial Museum—Closes at 6:00 p.m.)

Saturday—January 27

3:00 p.m. Post Meeting Cruise (Bermuda and Nassau)
Sail from New York on "Queen of Bermuda" (Ar. back in New York on February 3 at 9:00 a.m.)

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*To be presented by title.

*To be presented by title.

EXPOSITION EXHIBITORS AND THEIR EXHIBITS

HERE ARE THE names of the exhibitors who are scheduled for the 10th Air Conditioning Exposition — the International Heating & Ventilating Exposition, per latest advice at press time from the exposition management. Those listed with information on the products they will exhibit and the names of representatives who will be in attendance furnished these details direct to the publisher. With the booth numbers and the accompanying diagram of the exhibit hall, each exhibitor is easily located.

The exposition is under the management of the International Exposition Co., Charles F. Roth, manager, E. K. Stevens, associate manager.

A-J MFG. CO., 2119 Washington, Kansas City 8, Mo.—Booth 436
In attendance: Antone Artmaier, Jess Miller, Ernest Preuitt, Arthur S. Hurt, Jr.
Exhibiting: Registers, grilles and diffusers. Vertical fin single leaf register and sight- and light-proof grille will be featured.

A-P CONTROLS CORP., (formerly Automatic Products Co.), 2450 N. 32nd St., Milwaukee 45, Wis.—Booth 213
In attendance: R. W. Johnson, E. A. Vallee, A. A. Schubert, B. T. Carroll, F. J. Marshall, A. L. Neva, H. D. Youmans, R. E. Petersen, R. W. Sloane, A. L. Topp, S. Burghduff.
Exhibiting: Refrigeration and air conditioning controls; gas heating controls; oil heating controls. "Gasapack"; thermoelectric valve; thermostatic expansion valve; and oil heating solenoid valve will be featured.

ACE ENGINEERING CO., 1435 W. 15th St., Chicago 8, Ill.—Booth 422
In attendance: I. L. Schurman, J. W. Cowan, R. W. Bardach.
Exhibiting: Horizontal rotary oil burners for industrial and commercial use. Modulating "Uniflow" valve for viscosity compensation and straight line modulation (a standard feature of the exhibitor's "Uniflow" oil burners for No. 6 oil); new packless type manifold to facilitate field installation of No. 6 oil jobs; and combination gas-oil burner (commercial and industrial) will be featured.

ACME INDUSTRIES, INC., 600-618 N. Mechanic St., Jackson, Mich.—Booths 26 & 414
In attendance: C. N. Rink, J. T. Maloney, C. W. Millson, W. R. Funk, E. B. Dunphy, A. B. Newton, G. L. Baldwin, D. G. Merrill, P. A. Weatherwax, K. A. Weatherwax.
Exhibiting: "Dry-Ex" water chiller, shell and coil condensers, shell and tube condensers, oil separators, heat exchangers, "Blo-Cold" industrial unit cooler, evaporative condenser, and cooling tower. "Flow-Cold" liquid chiller and convectors will be featured.

ADELTA MFG. CO., INC., N. W. cor. 21st & Ellsworth Sts., Philadelphia 46, Pa.—Booth 343
In attendance: Martin Corbman, A. Corbman, Robert Corbman, Lewis Sobel, M. Goodman, Milton Parmet, Martin Posner, Gerald Schafer, Angelo Fasulo, Albert Derago.
Exhibiting: Prefabricated air conditioning duct and fittings, furnace pipe and fittings, and featuring one-piece snap-lock cleat.

AEROFIN CORP., 410 S. Geddes St., Syracuse 1, N. Y.—Booth 226

AFFILIATED GAS EQUIPMENT, INC.—see BRYANT HEATER DIV.

AIR CONDITIONING & REFRIGERATION NEWS, 450 W. Fort St., Detroit 26, Mich.—Booth 932
Exhibiting: Publication.

AIR CONTROL PRODUCTS, INC., Coopersville, Mich.—Booth 78
In attendance: Robert L. Leigh, Kenneth L. Babcock, Winston A. Clark, Donald E. Stoll, Claude E. Denton, Robert C. Hackenbruch, Clyde D. Allan.
Exhibiting: Registers, floor registers, ceiling registers, ceiling diffuser dampers, ventilators, grilles. A new style roof ventilator will be featured.

AIR CONTROLS, INC., DIV. of CLEVELAND HEATER CO., 2310 Superior Ave., Cleveland 14, Ohio—Booth 401
In attendance: B. G. Krause, S. S. Minnich, G. L. Schwarz, N. Busch, E. Frick.
Exhibiting: Furnace blowers, blower filter units, propeller fans, exhaust fans, window fans.

AIR DEVICES INC., 17 E. 42nd St., New York 17, N. Y.—Booths 106-108
In attendance: C. N. O'Day, G. J. Sweeney, T. A. Hughes, P. G. Daves, C. A. Eades, I. M. Day, Jr.
Exhibiting: "Agitair" air filters, grease filters, air diffusers (square, rectangular, circular); dampers, gravity roof top ventilators, and featuring diffuser-light fixtures.

AIR-MAZE CORP., 5200 Harvard Ave., Cleveland 5, Ohio—Booth 610
In attendance: W. B. Watterson, N. L. Lamprecht, J. D. Thomas, H. M. Flaherty.
Exhibiting: Permanent, cleanable type air filter panels; "Electromaze" electric air filter.

AIR & REFRIGERATION CORP., 475 Fifth Ave., New York 17, N. Y.—Booth 33
In attendance: Walter L. Fleisher, Daniel C. Lindsay, Harvey S. Dutcher, Joseph H. Burges, Harry C. Jones, Robert P. Perillo, Joseph S. Perillo, Leslie N. Leland.
Exhibiting: Capillary unit (air washer); insulated panels; dampers. Plastic cells for Capillary unit for special conditions will be featured.

AIRTEMP DIV.—see CHRYSLER CORP.

AIRTHERM MFG. CO., 700 S. Spring Ave., St. Louis 10, Mo.—Booth 233
In attendance: N. B. Barsha, B. Bronnemeier, F. P. Kohlbry, R. O. Reeves.
Exhibiting: Convectors; propeller fan type steam unit heaters; centrifugal fan type steam unit heaters; and gas and oil direct fired space heaters.

ALDRICH CO., Wyoming, Ill.—Booths 330-332
In attendance: P. M. Stephenson, E. L. Fox, L. R. Williams, B. Mulder.
Exhibiting: "Heat-Pak" steel heating boiler burner units, oil fired and gas fired; high pressure conversion oil burners. Line of boilers incorporating burner interchangeability with the possibility of converting from oil to gas or vice versa simply and quickly without changing boiler setup, as mounting provisions for oil burner and gas burner are similar, will be featured.

ALLIS-CHALMERS MFG. CO., Box 512, Milwaukee 1, Wis.—Booth 917
In attendance: A. D. Brown, J. R. Allen, R. H. Black, N. L. Danforth, H. E. Dickinson, A. I. Edwards, J. H. Hadley, J. F. Jenkins, L. H. States, W. H. Taylor, W. J. Weaver, L. F. Ballone, W. A. Meyer, J. Cable, F. J. Geiger, M. L. Murdock, W. Brixius, R. N. Brown.
Exhibiting: Redesigned fractional horsepower pump unit; a drip-proof, open-type, general purpose "Safety Circle" induction motor equipped with automatic "Vari-Pitch" drive operating a blower; a cutaway of the same motor; a cutaway of a redesigned close-coupled "Electrifugal" pump and motor; starter controls.

AMERICAN AIR FILTER CO., INC., 215 Central Ave., Louisville 8, Ky.—Booths 902-906
In attendance: Howard Pound, H. J. Noles, James May, Charles Wright, Charles Beatty.
Exhibiting: Electronic precipitators; self-cleaning air filters; washable air filters; disposable air filters; residential electronic air filters. "Electro-Klean" electronic air filter using disposable dry-type filter cells as the collector media will be featured.
Also see Herman Nelson Div.

AMERICAN ARTISAN, 6 N. Michigan Ave., Chicago 2, Ill.—Booth 12
In attendance: Frank P. Keeney, Chas. E. Price, Wallace J. Osborn, Robert A. Jack, George C. Cutler, James D. Thomas, John E. Peterson.
Exhibiting: American Artisan, technical books, market data.

AMERICAN BLOWER CORP., Detroit 32, Mich.—Booth A
Exhibiting: "Sirocco" ventilating fans.

AMERICAN GAS ASSOCIATION, 420 Lexington Ave., New York 17, N. Y.—Booth 518
In attendance: Clifford E. Hall
Exhibiting: Institutional exhibit for the gas industry.

AMERICAN HYDROVAC, PUMP DIV. OF PITZ FOUNDRY, INC., 290 Scholes St., Brooklyn 6, N. Y.—Booth 47

AMERICAN IRON AND STEEL INSTITUTE —see COMMITTEE ON STEEL PIPE RESEARCH

AMERICAN MACHINE & METALS, INC.—see DeBOTHEZAT FANS DIV.

AMERICAN RADIATOR & STANDARD SANITARY CORP., P. O. Box 1226, Pittsburgh 30, Pa.—Space B

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, 51 Madison Ave., New York 10, N. Y.—Booth 88

AMES IRON WORKS, Oswego, N. Y.—Booths 22 & 43
In attendance: J. J. Doyle, D. F. Lytle, C. A. Ferguson, F. H. Fox, J. A. East, R. C. Kratz, H. F. Winters, O. S. Williams.
Exhibiting: A 25 hp completely automatic, packaged type, light oil fired steam generator designed for 100 lb steam working pressure.

ANDERSON CO., V. D., 1935 W. 96th St., Cleveland 2, Ohio.—Booth 630
In attendance: William J. Gleason, Jr., Ralph E. Sams.
Exhibiting: "Super-Silvertop" steam traps, "Silvertop" air release valves, Y type pipe line strainers, float type traps, and featuring new small high pressure forged steel steam traps.

ANEMOSTAT CORPORATION OF AMERICA, 10 E. 39th St., New York 16, N. Y.—Booth 600
In attendance: F. Honerkamp, G. R. Wallen, R. F. Hayes, C. M. Wilson, W. F. Peters, V. F. Self.
Exhibiting: Air diffusers.

ANTHRACITE INSTITUTE, 237 Old River Rd., Wilkes-Barre, Pa.—Booths 147 & 150
In attendance: Truman M. Dodson, J. E. Axeman, W. S. Anderson, W. H. Douglas, W.

R. Frye, A. H. Noll, Oscar Ettari, O. C. Bailey, Ora Jenkins, H. G. Gabel, George Warner, Ralph S. Dunne, C. I. Dissinger, Guy Winters, Glen Blank, John D. Wentz, F. L. Cassel, C. H. Olandt, George E. Luders, A. T. Bertolette, H. D. Merrill, R. H. Loomis, J. F. Fisher, W. F. Bowen, L. C. Bowen, T. G. Bridge, G. L. Brown, J. T. Gillespie, E. W. Gorringe, A. F. Ludolph, R. E. Rawles, R. M. MacDonald, A. C. Traub, J. R. Kemp, J. D. Merrill, J. T. Letkey.
Exhibiting: Automatic anthracite heating equipment; "Anthratube"; warm air furnace-stoker units, stokers; boiler burner units.

APPLEMAN GLASS WORKS, Bergenfield, N. J.—Booth 448
In attendance: Leon Appleman, Kenneth Appleman.
Exhibiting: "Electriglas" radiant heating panels, exhibited for the first time at International Heating & Ventilating Exposition.

APRIL SHOWERS CO. INC., 4126 Eighth St., N. W., Washington 11, D. C.—Booth 727
In attendance: M. Bigelow MacPherson, I. E. Leininger, J. T. Butler, Mr. Proctor, Leonard H. Holder.
Exhibiting: Automatic roof cooling system; new "Apsco" electric hydraulic timer for saving water; air cleaned sprays for remote compressed air cleaning. Timer for balance of precipitation against the period of evaporation, and demonstrator for showing air cleaning of sprays remotely will be featured.

ARMSTRONG CORK CO., Lancaster, Pa.—Booths 338-340
In attendance: J. W. Liddell, S. C. Martin, H. J. Row, E. E. Tanguy, F. D. Rupprecht, F. L. Grant, A. P. Tingle, R. S. Broas, J. F. Isaacs, P. M. Hummer; V. J. Amorose, J. F. Boyd, H. J. Copestick, A. L. Hangliter, H. N. Urban.
Exhibiting: Corkboard; cork covering; heat insulation products; roof insulations, including "Temlok", corkboard and asphalt impregnated "Temlok." An insulating firebrick combustion chamber will be featured.

ARMSTRONG FURNACE CO., 851 W. Third Ave., Columbus 8, Ohio—Booths 122-126
In attendance: L. G. Hickok, F. W. Vaughn, H. G. Hays, George Zimbelman, H. C. Galleher, G. B. Lytle, T. M. Gallagher, P. Y. Matthews, S. H. Levine.
Exhibiting: Gravity, basement model and "Hi-Boy" units in residential sizes for gas and oil firing. The units all have rather recent design changes, and the oil fired units will be making their first appearance.

ARMSTRONG MACHINE WORKS, Three Rivers, Mich.—Booth 205
In attendance: A. E. Armstrong, T. H. Rea, O. E. Ulrich.
Exhibiting: Steam traps, air traps, unit steam humidifiers, heating controls, refrigerant gas purgers, and featuring "Thermoflo" heating controls for forced circulation water systems.

ARMSTRONG PRODUCTS CORP., 1st St. and 7th Ave., Huntington 1, W. Va.—Booths 636-638
In attendance: L. O. Reese, M. S. Nicholson, W. W. Chatfield, J. Blaine Kelsey.
Exhibiting: Representative models from line of gas fired space heaters, including new fan-equipped vented circulators which will be shown for the first time.

ATLANTIC PIPEBENDING & FABRICATING CORP., 552 River Rd., Edgewater, N. J.—Booth 646
In attendance: Samuel H. Nitzberg, John H. Macaulay.
Exhibiting: Radiant heating coils and bends, etc. It is planned to demonstrate a ball test on coils, with a steel ball 1/8 in. in diameter less than the inside diameter of the pipe passing through an entire coil with the aid of a little air pressure.

AUER REGISTER CO., 6600 Clement Ave., Cleveland 5, Ohio—Booth 847
In attendance: George R. Metzger, H. F. Curtis, W. H. Tonner, E. H. Ruppert.
Exhibiting: Warm air registers and grilles, air conditioning registers and grilles, perforated grilles (ornamental and decorative), clothes chute doors. New line of "Streamliner" air conditioning registers and grilles will be featured.

AU-TEMP-CO CORP., 521 Fifth Ave., New York 17, N. Y.—Booth 46

AUTOMATIC DEVICES CO. INC., 53 W. Jackson Blvd., Chicago 4, Ill.—Booth 713
In attendance: H. T. Kucera, O. W. Dobson, E. A. Hartnett, Curt Soderberg, Charles Andrews, Paul Bunten, Roy Snypp, Tom Burke, Tom Mansfield, Gene Clary, Gus Triolo, John Ridge.
Exhibiting: "Weather Man" weather actuated outdoor temperature regulator that determines indoor heating requirements in advance; "Weather-Chron" temperature actuated time switch that automatically changes the length of the heating day to match the weather. It is expected that "a new departure in hot water heating control" will be exhibited for the first time.

AUTOMATIC FIRING CORP., 4417 Oleatha Ave., St. Louis 16, Mo.—Booth 19
In attendance: James J. Lee, Sidney Strauss, F. J. Hollerbach, P. Oehler, E. Kuehn, J. Van-Dillen.
Exhibiting: "Cool-A-Matic" packaged air conditioner; "Fridg-A-Fire" combination heating and cooling unit; room cooler; "Gas-A-Fire" gas fired "Lo-Boy" furnace; "Oil-A-Fire" oil fired "Hi-Boy" furnace; domestic gas conversion burner; commercial gas conversion burner. "Dual-A-Fire" combination gas and oil unit, and "Fridg-A-Fire" packaged air conditioner operated by a semi-hermetically sealed compressor combined with a forced warm air furnace will be featured.

AUTOMATIC HUMIDIFIER CO., 19th & Main Sts., Cedar Falls, Ia.—Booths 52-54
In attendance: J. W. Galloway, W. E. Simpson, R. M. Galloway.
Exhibiting: "Thermo-Drip" and "Vaporite" humidifiers.

AVCO MFG. CORP.—see LYCOMING-SPENCER DIV.

AXEMAN-ANDERSON CO., Williamsport, Pa.—Booths 147 & 150

BACHARACH INDUSTRIAL INSTRUMENT CO., 7000 Bennett St., Pittsburgh 8, Pa.—Booth 219
In attendance: John W. Smith.
Exhibiting: Combustion testing instruments, including "Fyrite" kits and vaporizing burner adjusting kit as well as instruments for balancing heating systems. Among these will be "Tempscribe" temperature and operation recorders, "FloRite" direct reading velocity meter, and sling psychrometer. Neutral pressure point indicator; duplex kit made up of CO_2 and O_2 analyzers; dial type stack thermometer; and sling psychrometer will be featured.

BAKER REFRIGERATION CORP., South Windham, Me.—Booth 643

BALTIMORE AIRCOIL CO., INC., 715 W. Pratt St., Baltimore 1, Md.—Booth 621
In attendance: John Engalitcheff, Jr., Ray R. Forseille, Mrs. M. K. Kok, R. W. Pentecost, H. G. Curry.
Exhibiting: New line of evaporative condensers and cooling towers.

BARBER-COLMAN CO., 229 Loomis St., Rockford, Ill.—Booth 247
In attendance: C. J. Braatz, E. A. Greenlee, H. H. Kieckhefer, D. L. Dittloff, H. E. Shugars, A. W. Schach, R. D. Richards.
Exhibiting: Automatic control and air distribution products for heating and air conditioning. New temperature regulating equipment and new air distribution products will be featured.

BARD MFG. CO., Bryan, Ohio—Booths 836-840
In attendance: Charles H. Tomes.
Exhibiting: Oil fired furnace equipment; gas fired furnace equipment; electric water heaters; gas water heaters.

BARNES & JONES, INC., 128 Brookside Ave., Boston 30, Mass.—Booth 83
In attendance: Walter E. Barnes, Eric Lund, Carl Larson, Norman Shaw, John B. Hogan, Walter Grono, Harry Eells, Everett Ryan.
Exhibiting: Thermostatic traps, float and thermostatic traps, radiator supply valves.

BEATON & CADWELL MFG. CO., New Britain, Conn.—Booth 328
In attendance: R. H. Hubbard.
Exhibiting: Safety valves (ASME type), self closing temperature and pressure valves, feed valves, reducing valves. Moving demonstration of safety relief valve and self closing temperature and pressure relief valve will be featured.

BELL & GOSSETT CO., 8200 N. Austin Ave., Morton Grove, Ill.—Booth 231
In attendance: E. J. Gossett, C. E. Pullum, R. E. Moore, R. A. Patterson, Frank C. Hackett, W. A. Boone, L. L. Arbuckle, Al Meeg, M. Hofmeister, L. J. Smith, Harold Lockhart, J. H. Hanley, J. A. Ivester, Kenneth Sprague, J. Harry Hall, Leroy Hokenson.
Exhibiting: "B & G Hydro-Flo" hot water heating specialties including boosters, heaters, valves, "Airtrol" system, "Comfort Control" system, etc. Also, industrial line of products such as heat exchangers, centrifugal pumps and refrigeration components.

BINKS MFG. CO., 3114-40 Carroll Ave., Chicago 12, Ill.—Booths 635-639
In attendance: Burke B. Roche, E. F. Watts, P. L. Griffin, John Rowe, C. R. Kranz, A. G. Stacy, James Doherty, George Allen, L. A. Hamilton, I. M. Day, Sr., I. M. Day, Jr., J. B. Starkweather.
Exhibiting: Comprehensive line of small mechanical draft and atmospheric cooling towers, in addition to a complete line of spray nozzles used for industrial applications.

BORG-WARNER CORP.—see INGERSOLL PRODUCTS DIV. and NORGE HEAT DIV.

BOSTON MACHINE WORKS CO., Lynn, Mass.—Booth 843

BROOKSIDE PRODUCTS CO., INC., McCordsville, Ind.—Booth 421
In attendance: Claude Forth, Sr.
Exhibiting: Fans and blowers.

BROWN PRODUCTS CO., 97-12 Metropolitan Ave., Forest Hills, N. Y.—Booths 640-642
In attendance: A. Brown, M. Sterling, S. Schwartz, M. Portnoy, O. Mann, George Hench.
Exhibiting: Baseboard radiation; convectors; unit heaters; oil fired water heaters; boiler burner units. New design of recess convector will be featured.

BRUNDAGE CO., 512 N. Park St., Kalamazoo 11, Mich.—Booth 62
In attendance: H. F. Brundage, F. W. Brundage, P. S. Agey, W. T. Koehlinger.
Exhibiting: Blower assembly, blower-filter unit, "Air renewer."

BRYANT HEATER DIV., AFFILIATED GAS EQUIPMENT, INC., 17825 St. Clair Ave., Cleveland 10, Ohio—Booths 2 and 4
In attendance: J. M. Traugott, G. L. Miller, Burt England, Ros Gillette, Harry Griffith, Ray Mott, Larry Yost, Ken Shaw.

Exhibiting: Complete line of gas heating equipment, featuring "Model 428" fan circulator.

BUFFALO FORGE CO., 490 Broadway, Buffalo 5, N. Y.—Booth 79

BUILDERS-PROVIDENCE, INC., 345 Harris Ave., Providence 1, R. I.—Booth 55
Exhibiting: "Shuntflo" meters; "Propeloflo" meter; "Flo-Watch"; "Flo-Gage". "Shuntflo" meters measure steam, air or gas, "are valuable in cost accounting and detecting avoidable losses, frequently effect savings of from 10 to 30 percent"; "Propeloflo" meter measures flow of water and other liquids; the "Flo-Watch" is a differential meter for steam, air, gas, cold or hot water; the "Flo-Gage" is midget differential meter that measures liquids or gases.

BUNDY TUBING CO., 8109 E. Jefferson, Detroit 14, Mich.—Booth 325
In attendance: P. A. O'Connell, A. F. Bernthal, W. F. Kendall.
Exhibiting: Steel radiant heating coils, made from both plain copper coated and tinned "Bundyweld".

BURNHAM CORP., BOILER DIV., 2 Main St., Irvington, N. Y.—Booths 223-225-227
In attendance: V. A. Good, F. R. Brophy, A. A. Miller, H. R. Way, J. J. Hogan, G. Frank Bacon, W. H. Phillips, W. C. Heagy.
Exhibiting: "Hy-Power Base-Ray" radiant baseboards; radiant radiator; slenderized radiator; "Pacemaker" oil boiler and oil heating unit; "Yello-Jacket" oil boiler and oil heating unit; gas boiler.

BUSH MFG. CO., 179 South St., West Hartford, Conn.—Booth 817
In attendance: James W. Hatch, Charles T. Cavanaugh, David B. Zipser, Alfred J. Houle, H. Russell Prescott, Frank C. Hawk, Cecil Boling, Norton Miller.
Exhibiting: Air handling unit; cooling tower; water coil; DX coil; steam coil; and non-freeze steam coil. Specially designed high pressure steam coil will be featured.

CAREY MFG. CO., PHILIP, Lockland, Cincinnati 15, Ohio—Booth 828
In attendance: W. D. Callan, J. J. Smiley, Jr., F. J. Smith, C. B. Berger, H. J. Peterson, E. S. Walls, J. H. Jones, H. K. Marcy, R. H. Wyatt, R. L. Gough, C. E. Howard, W. C. Bowman.
Exhibiting: Attic fans; kitchen and window ventilators; "Careyduct" asbestos duct for heating, piping and air conditioning systems.

CARRIER CORP., 302 S. Geddes St., Syracuse 1, N. Y.—Booths 605-607

CENTURY ELECTRIC CO., 1806 Pine St., St. Louis 3, Mo.—Booth 543
In attendance: G. C. Henderson, R. N. Hill, A. Neher, O. S. Imes, M. McInerney, W. J. Nace, G. H. Pechin, J. M. Hicks, G. E. Moe, E. W. Pritchard.
Exhibiting: A wide range of the various types and sizes of motors that are used particularly in the heating, ventilating and air conditioning industries. An SC 680 frame that contains motors in horsepowers from 150 to 400 hp; a 225 SC disassembled motor with aluminum die cast rotor, a vertical fan motor with "Oil-Lite" bearings; a streamlined oil burner motor; and a cut-away of an integral horsepower gear motor will be featured.

CHACE CO., W. M., 1600 Beard Ave., Detroit 9, Mich.—Booths 322-324

CHAR-GALE MFG. CO., 4325 Hiawatha Ave., Minneapolis 6, Minn.—Booth 64
In attendance: L. C. Johnston, C. L. Johnston, D. E. Johnston, N. J. Dovolis.
Exhibiting: Warm air ducts and fittings; pipe and elbows; registers and grilles; humidifiers. Complete packaging of entire line of merchandise will be featured.

CHELSEA FAN & BLOWER CO. INC., 639 South Ave., Plainfield, N. J.—Booth 406

CHICAGO BLOWER CORP., 4558 W. Congress St., Chicago 24, Ill.—Booth 606
In attendance: F. H. Gohl, T. W. McManus.
Exhibiting: "Multiblade" exhausters; "Gyra-Flo" power exhausters; "Axial Flo" power exhausters.

CHICAGO PUMP CO., 2300 Wolfram St., Chicago 18, Ill.--Booth 534
In attendance: G. D. Bers, Milton Spiegel, H. E. Martin, L. M. Nechine, John C. Redmond.
Exhibiting: "Flush-Kleen" sewage ejector; complete line of close-coupled pumps. (including 2 in. sectioned to show the construction); 6 in. split case double suction pump with casing opened; "Sure Return" condensation pump and receiver; duplex "Condo-Vac" vacuum and boiler feed pump; side suction mechanically sealed pump driven through flexible coupling. The "Sure Return" pump and receiver has been completely redesigned and will be exhibited for the first time. The close-coupled pumps have been redesigned, are more compact, and are equipped with a mechanical seal. The model of the "Flush-Kleen" sewage ejector has been refinished and modernized to demonstrate its clog-proof features. The side suction pump is one of an entirely new line for capacities up to 500 gpm and heads up to 215 ft.

CHRYSLER CORP., AIRTEMP DIV., 1600 Webster, Dayton 1, Ohio—Booth 301
In attendance: C. S. Stackpole, M. J. Leonard, M. T. Bard, William B. Magill, Ray Donley.
Exhibiting: Packaged air conditioning, central systems, gas and oil heating, room coolers, dehumidifiers, and featuring 11 ton packaged air conditioner.

CLARAGE FAN CO., 619 Porter St., Kalamazoo, Mich.—Booth 813
In attendance: C. O. Fury; E. N. Jacobs, R. P. Bird, A. L. Otis, E. A. Rehn, J. Q. Treadway, J. D. Crabtree, R. H. Seibert.
Exhibiting: Sprayed coil type air conditioner; high speed ventilating fan, ring oiling bearings (plain and water cooled); industrial exhaust fan, domestic furnace and air conditioning fan. The sprayed coil conditioner is new to the exhibitor's line.

CLAYTON & LAMBERT MFG. CO., 1701 Dixie Highway, Louisville 10, Ky.—Booth 744
In attendance. R. J. Miller, P. G. Pfriem, John B. Henderson, C. J. Davis.
Exhibiting: "Lamneck" furnace pipe and fittings; "C & L" blow torches and fire pots; "Hoffman" water heaters.

CLEVELAND HEATER CO.,—see AIR CONTROLS, INC., DIV.

COAL-O-MATIC CO., Trucksville, Pa.—Booths 147 & 150

COLEMAN CO., INC., Wichita 1, Kans.—Booths 71-73

COLE-SEWELL ENGINEERING CO., 2288 University Ave., St. Paul 4, Minn.—Booth 620
In attendance: H. J. Sewell, I. E. Loring, E. W. Laudert.
Exhibiting: Draft governors; draft "Korektors".

COLUMBIA BURNER CO., 729 Ewing St., Toledo, Ohio—Booth 347

COMBUSTION CONTROL CORP., 77 Broadway, Cambridge 42, Mass.—Booth 69
In attendance: J. A. Long, B. E. Shaw, L. D. Sibley, D. S. Nichols, P. K. Ryder, P. N. Bredesen.
Exhibiting: A new development in industrial and commercial flame failure controls and safeguards for manually and automatically ignited oil and combination gas-oil burners will be introduced. "Fireye" programming control with new "Firetron" scanner for automatically ignited oil burners; flame failure safeguard system featuring the new scanner for manually and semi-automatically ignited oil burners; multiple scanner gas oven flame failure control, accommodating up to four scanners with a single relay control; new smoke indicator; and standard combustion safeguards will be on display.

COMBUSTIONEER DIV.—see STEEL PRODUCTS ENGINEERING CO.

COMMERCIAL FILTERS CORP., 18 W. Third St., Boston 27, Mass.—Booth 622
In attendance: R. L. Fielding, E. W. Dumler, J. R. Chisholm, J. V. Calhoun, Jr., Dean Stapp, Robert Schadler.
Exhibiting: "Fulflo" filters for oil burners for the elimination of trouble arising from minute solid impurities in heating oils; filters for lubricating oils, gasoline, oil burners, bulk plants, tank trucks, dispensing pumps. Effectiveness of the filters will be "dramatically demonstrated."

COMMITTEE ON STEEL PIPE RESEARCH, AMERICAN IRON AND STEEL INSTITUTE, 350 Fifth Ave., New York 1, N. Y. —Booth 339
In attendance: George D. Lain, E. Anderson, W. S. Badger, T. E. Conklin, G. H. Daman, Roy Grinter, D. E. Hutchinson, W. G. Laister, J. F. Macaulay, J. C. Mallory, R. Patterson, E. G. Souders, W. H. Taylor, C. W. Test, E. G. Weymouth.
Exhibiting: Steel pipe for heating systems. Radiant panel heating systems and snow melting installations will be featured.

CONDENSATION ENGINEERING CORP., 3511 W. Potomac, Chicago 51, Ill.—Booth 821
In attendance: M. M. Chester, C. W. Osburn, H. K. Allen, George Thompson.
Exhibiting: Prefabricated chimney. New style flue housing top and rain cap, designed to improve appearance, eliminate rain from entering the flue and help prevent down drafts, and a newly U. L. approved flue for basement installations with all types of fuel will be featured.

CONGRESS DRIVES DIV., TANN CORP., 3750 E. Outer Dr., Detroit 34, Mich.—Booth 21
In attendance: Stuart Chosid, Otis L. Johnson, Edward Tann, James J. Walsh.
Exhibiting: Pulleys, v-belts, pillow blocks, v-belt clutches, sheaves.

CONKEY CO., H. D.—see FIELD CONTROL DIV.

CONNOR ENGINEERING CORP., W. B., Danbury, Conn.—Booth 831
In attendance: John H. Bartol, Henry A. Baker.
Exhibiting: "Dorex" air recovery equipment, high pressure air diffusers, "Kno-Draft" adjustable air diffusers, and featuring new high pressure noiseless air diffusers.

CONTINENTAL AIR FILTERS, INC., 2720 Helm St., Louisville, Ky.—Booth 218
In attendance: William K. Gregory, M. L. Heeb, S. S. Emison, A. G. Mutimer.
Exhibiting: Automatic self cleaning air filters; washable, viscous, unit air filters; and filter cells for air washers.

COPELAND REFRIGERATION CORP., Sidney, Ohio—Booth 85
In attendance: H. E Thompson, F. J. Gleason, W. G. Von Meyer, R. G. Berg, D. H. Bodine.
Exhibiting: "Copelametic" and open type condensing units and compressors.

CORBMAN BROS., INC., 315 N. 7th St., Philadelphia 6, Pa.—Booth 617
In attendance: A. L. Corbman.
Exhibiting: Furnace pipe and fittings, air conditioning ducts and fittings, "Easy-Flo" system, extended plenum system.

C-O-TWO FIRE EQUIPMENT CO., U. S. Highway 1, Newark 1, N. J.—Booths 342-344

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.—Booths 305-307-309
In attendance: J. H. Geiss, J. P. McCarney, Frank Del Prete, W. D. Howard, D. J. Molloy, P. W. Vandenberg, J. A. Dwyer, C. T. Pollock, H. H. Simmons.
Exhibiting: New oil fired boiler for baseboard or panel heating; wet base oil fired boiler for utility room or basement installation; conversion type boiler for coal, oil or gas; "Crane-Line Basmor" gas fired boilers; "Crane-Line" warm air furnaces, gas and oil fired. A 1 ft baseboard segment which makes for flexibility of installation will be introduced; this unit, togther with channeled wood baseboard and the standard 2 ft radiant and radiant convector type cast iron baseboards, simplifies inside and outside corner installations.

CROTTY MFG. CORP., 133-15 35th Ave., Flushing, N. Y.—Booth 134
In attendance: Michael C. Crotty, Michael J. Mintern, Edward Alstrom, Ralph J. Sibilla.
Exhibiting: Water wall and "D.B." boilers.

CURTIS REFRIGERATING MACHINE DIV. OF CURTIS MFG., CO., 1905 Kienlen Ave., St. Louis 20, Mo.—Booth 8
In attendance: H. C. Morrison, H. J. Nettler, J. P. Gilbert, K. T. Rockey, G. C. Helde, W. A. Fleischer, N. H. Behrend, G. W. Schultz, F. J. Hanley, R. M. Nelson.
Exhibiting: New 2 ton packaged air conditioning unit; new 40 hp compressor unit, complete with automatic capacity reduction; samples of new combination air and water cooled condensing units; cutaway model of compressor.

DeBOTHEZAT FANS DIV., AMERICAN MACHINE & METALS, INC., East Moline, Ill. —Booth 440
In attendance: P. S. Mumford, F. C. Weicker, C. J. Gaspar, Ray Bouslough, M. Beline.
Exhibiting: Stainless steel "Bifurcator" fan, "Power Flow" roof ventilator, "Hy-V" air jet, stainless steel fan wheels, and featuring induced draft "Bifurcators".

DETROIT LUBRICATOR CO., 5900 Trumbull Ave., Detroit 8, Mich.—Booth 734 & Space B

DETROIT REGULATOR CO., 1742 Rivard, Detroit 7, Mich.—Booth 807
In attendance: Frank Kern, Jr., D. L. Zorn, D. B. Anderson, Tony Borgman.
Exhibiting: "Maxitrol" low pressure gas appliance regulators, featuring an animated operating display of plastic models dramatizing actual operation of the regulators.

DEVICES, INC., 214 E. 53rd St., New York 22, N. Y.—Booth 75
In attendance: V. L. Yepsen, Harold N. Davis, Alex O'Hare, E. J. Hartman.
Exhibiting: "Miracle" surface anchors for attaching cork, "Fiberglas", "Foamglas" and batts to ducts, walls and ceilings.

DODGE CORP., F. W., 119 W. 40th St., New York 18, N. Y.—Booth 214

DOLE REFRIGERATING CO., 5910 N. Pulaski, Chicago 30, Ill.—Booth 806
In attendance: L. E. Smith, C. C. Ryan, O. J. Armstrong, A. F. Sawyer, A. B. Brady, E. C. Wilbur.
Exhibiting: "Ice-Cel" latent heat storage unit for air conditioning, chilling water, ice accumulator (to be shown in operation); heat exchangers, vacuum cold plates for all refrigeration purposes. "Ice-Cel" storage battery of refrigeration will be in operation and showing ice build-up. Its application for air conditioning for peak loads of short duration and "magic chart" showing how present systems can be rejuvenated and how it cuts costs and saves space will be featured.

DOLE VALVE CO., 1933 Carroll Ave., Chicago 12, Ill.—Booth 405
In attendance: J. Francis Lund, Henry Aronson, Willis Pennington, Albert Toll, Stuart G. Phillips.
Exhibiting: Air and vacuum valves, including new valve for hot water heating systems which is a completely automatic venting device. Thermostatic air control for individual room temperature control in forced warm air heated buildings, flow control valves, and water mixers for tankless heaters will also be shown.

DOLLINGER CORP., Rochester 3, N. Y.—Booth 408

DOMESTIC ENGINEERING CO., 1801 Prairie Ave., Chicago 16, Ill.—Booth 418
Exhibiting: Publication.

DOYLE VACUUM CLEANER CO., 225 Stevens St., S. W., Grand Rapids 2, Mich.—Booth 748
In attendance: Dewey I. Doyle, Jr., Patrick E. Doyle, Harry E. Arnold, Harry E. Coffman.
Exhibiting: "Grand Rapids" furnace cleaners with attachments.

DRAVO CORP., Dravo Bldg., Fifth and Liberty Aves., Pittsburgh 22, Pa.—Booth 732
In attendance: D. R. Berg, W. L. Davidson, Dave Henderson, H. A. Pietsch, Jack Mason, W. R. Hoffman, P. Stephen, P. Tietjen, A. A. Kosarin, F. Gerhart, W. Smedley, H. K. Hicks, G. Beidler, W. P. Barrett, T. W. Eshbach.
Exhibiting: "Counterflo" direct fired air heater.

DUNHAM CO., C. A.; 400 W. Madison St., Chicago 6, Ill.—Booths 718-722.
In attendance: F. E. Schmidt, W. S. Browning, E. F. Ford, E. W. Cardiff, L. D. Mandell, J. A. Butler, E. G. Powell, H. S. Marshall.
Exhibiting: Unit heaters; convectors; baseboard; specialties; pumps; finned pipe radiation; "Metro" and "Vari-Vac" heating systems. New cabinet type unit heater, convector, and "Fin-Vector" finned radiation will be featured.

DURANT INSULATED PIPE CO., 1015 Runnymede St., P. O. Box 88, East Palo Alto, Calif.—Booth 717
In attendance: A. H. Isenberg, William H. Buck.
Exhibiting: Prefabricated insulated pipe conduit and accessories. New insulating type plate anchor will be featured.

DWYER MFG. CO., F. W., 317 S. Western Ave., Chicago 12, Ill.—Booth 44
In attendance: F. W. Dwyer, J. G. Dwyer.
Exhibiting: Draft gages, CO_2 indicators and test sets, manometers, "Magnehelic" pressure gages, pitot tubes. "Visi-Float" air filter gages will be featured.

EAGAN CO., INC., WALTER H., 2336 Fairmount Ave., Philadelphia 30, Pa.,—Booth 723
In attendance: David J. Smith, John McGonigal, Tobias Koch, Richard Meyer.
Exhibiting: Condensate pumps; boiler feed pumps; turbine pumps; centrifugal pumps. New low cost "Eagan Eagle" condensate pump, rated up to 8000 sq ft EDR at 20 psi, will be featured.

EASTERN FOUNDRY CO., Boyerstown, Pa.—Booth 314

ECKHART MFG. CO., INC., 931 Lehigh Ave., Union, N. J.—Booth 413
In attendance: Arnold Eckhart, Jr., Walter Eckhart, A. Glicksman, A. T. August, H. Killby, Sr., William Croker, Arthur E. Wood.
Exhibiting: "Silent Korth" oil burners, and featuring flange burner adaptable to all boiler-burner units.

ECONO PRODUCTS CO., 17 State St., New York 4, N. Y.—Booth 721

ELECTRIC FURNACE-MAN, INC., Emmaus, Pa.—Booths 147 & 150

EMERSON ELECTRIC MFG. CO., 8100 Florissant Ave., St. Louis 21, Mo.—Booth 317
In attendance: O. D. Metz, T. J. Greenan, W. R. Fraser, R. E. Otto, L. L. Schneider.
Exhibiting: 1/20 to 5 hp motors; exhaust and ventilating fans. Demonstration of new shielded starting switch for split-phase and capacitor-start motors will be featured.

EMPIRE STOVE CO., 918 Freeburg Ave., Belleville, Ill.—Booth 60
In attendance: Lee A. Brand, Robert H. Ewing, L. J. Rodauch, Ray Mills, George R. Strode, Ward Williams.
Exhibiting: Gas floor furnaces; gas recessed heating systems. Zone heating by using recessed heating system will be featured.

FAIRBANKS CO., 393 Lafayette St., New York 3, N. Y.—Booth 933
In attendance: W. F. Guthrie, W. T. Rogers, G. R. Sternfield, Herbert Jones, J. C. Valentine, L. M. Nellenger, I. C. Massagli, N. F. Unmuth, J. J. Langan, A. W. Hoogs.
Exhibiting: Bronze valves, iron body valves, solder end bronze valves, "Fairco-Braze" threadless bronze valves, "Faircoseal" bronze valves, "Dart" malleable iron unions and union pipe fittings, "Pic" steel unions, two wheel hand trucks, platform hand trucks, pressed steel casters. It is planned to feature the solder end bronze valves and the threadless bronze valves. A new 150 lb throttle-port bronze globe valve and a new 300 lb bronze gate valve will also highlight the exhibit.

FAIRBANKS, MORSE & CO., 600 S. Michigan Ave., Chicago 5, Ill.—Booth 539
In attendance: William F. Bowen, Loin C. Bowen, Thomas G. Bridge, George L. Brown, Thomas Gillespie, Edward W. Gorringe, August F. Ludolph, Ralph E. Rawles, Russell M. MacDonald, A. C. Traub, J. R. Kemp, J. D. Merrill, J. T. Letkey.
Exhibiting: Oil, gas, and coal fired furnaces, "Lo-Boy" and "Hi-Boy"; oil and gas fired suspended units; conversion oil and conversion gas burners; oil, gas, coal fired and all-fuel boilers; anthracite bin-feed stokers. Horizontal suspension furnace, either gas or oil, which can be converted from a suspended unit to a floor installation by simply standing the unit in an upright position and turning the burner, controls and inspection plate 90 deg. and designed for installations where the saving of floor space is desired or necessary, i. e. filling stations, garages, basementless homes (put it into the rafters), etc., will be featured.

FARR CO., 2615 Southwest Dr., Los Angeles 43, Calif.—Booth 18
In attendance: R. S. Farr, F. X. Shea, W. H. Welty, E. Kirkpatrick, H. J. Kennedy.
Exhibiting: "Far-Air" self-washing filter, other air filters, grease eliminator.

FASCO INDUSTRIES, INC., P. O. Box 509, Rochester, N. Y.—Booth 334

FEDDERS-QUIGAN CORP., 57 Tonawanda St., Buffalo 7, N. Y.—Booths 42 and 63
In attendance: Robert E. Cassatt, F. A. Mitchell, Ted Nemes, H. G. Williams, E. M. Becker, J. H. Seippel, J. D. Hayes, F. G. Stock, M. Frank.
Exhibiting: Room air conditioners, baseboard radiation, wall radiation, convector radiators, electric water coolers.

FEDERAL BOILER CO., Midland Park, N. J. —Booth 810

In attendance: Ray Shuster, James Legg, Oscar Mann, Sol Mattuck, Ray Rathe, F. Murphy.

Exhibiting: Complete line of boilers for steam, hot water or radiant heat.

FIELD CONTROL DIV., H. D. CONKEY CO., Mendota, Ill.—Booth 708

In attendance: C. W. Potter, Lee N. Beardsley, R. Millholland, W. Hirsch.

Exhibiting: Barometric draft controls.

FITZGIBBONS BOILER CO., INC., 101 Park Ave., New York 17, N. Y.—Booth 513

In attendance: Paul K. Addams, John R. Collette, Gilbert Nelligann, G. E. Olsen, R. C. Malvin, E. N. Black III, W. C. Wetherstine, Jr., F. J. McCusker.

Exhibiting: Gas fired and oil fired boilers, Scotch marine boiler, "R.Z.U. Junior" boiler. Residential boiler with 66,000 and 77,000 Btu per hr SBI net ratings, AGA approved gas fired units, and Scotch marine boiler will be featured.

FOREST CITY FOUNDRIES CO.—see NIAGARA FURNACE DIV.

FRICK CO., Waynesboro, Pa.—Booth 92

In attendance: Cyril Leech, Russell Moore, P. H. Buch, W. O. Kline, M. W. Garland, M. B. Watts, W. H. Aubrey, G. E. Elden, W. L. Bain, Terry Mitchell, C. C. Smith, R. M. Shuford, W. J. Dugas, R. T. Snively, J. T. Murphy.

Exhibiting: 5 hp unit air conditioner, four cylinder "Eclipse" compressor cut-away and operated in slow motion by a geared motor, a new nine cylinder compressor which has never been exhibited before, photographs of installations.

FRIGIDAIRE DIV., GENERAL MOTORS CORP., 300 Taylor St., Dayton 1, Ohio—Booth 68

In attendance: B. C. Wagner, C. F. Wood, E. J. Boyer, R. Woodward, H. E. Martin, C. R. Purnhagen, R. G. Bachman, L. J. Krantz.

Exhibiting: Representative models of broad air conditioning lines, including 1/2 and 1 hp window room units; a remote floor type room unit: 3 and 10 ton packaged units; large and small capacity reciprocating compressors; "Multipath" cooling units; a dehumidifier; and an operating water cooler. An interesting highlight of the exhibit will be an operating cutaway model of the 3 ton conditioner. In addition, window room units will be equipped with transparent plastic tops so that visitors can watch models in operation. A cutaway dehumidifier and water cooler will also be operating.

FUELOIL & OIL HEAT, 232 Madison Ave., New York 16, N. Y.—Booth 939

Exhibiting: Publication.

FULTON SYLPHON DIV., ROBERTSHAW-FULTON CONTROLS CO., Knoxville 4, Tenn.—Booths 429-431

GANNON CO., INC., RUSSELL R., 5037 Beech St., Cincinnati 12, Ohio—Booth 938

In attendance: Russell R. Gannon, S. E. Hager, B. N. Cryder.

Exhibiting: Corridor and under-window classroom unit ventilators, and featuring "Inertia Type" air conditioning system and "Pressurizing" heating, ventilating and air conditioning unit.

GAS HEAT MAGAZINE, 17 E. 37th St., New York 16, N. Y.—Booth 939

Exhibiting: Publication.

GENERAL BLOWER CO., Morton Grove, Ill.—Booth 232

In attendance: W. W. Meyer, C. J. Yamas, J. J. Ferretti.

Exhibiting: Fans and blowers.

GENERAL CONTROLS CO., 801 Allen Ave., Glendale 1, Calif.—Booth 702

In attendance: J. F. Ray, W. A. Ray, Fred E. Weldon, B. L. Lerch, Roger Rosell, R. M. Korty, R. C. Boehm, Douglas Sterner, J. Fallon, Charles Taber, C. McCarthy, C. C. Tischler, Paul Palmgren, R. L. Strongman, J. Coleman, W. L. Buck, Fred Angier, Jay Miller.

Exhibiting: Automatic controls for heating, refrigeration, air conditioning and industrial applications. Thermostats, solenoid valves, relays, motor valves, low water cutouts, expansion valves, limit controls, regulators and diaphragm valves will be featured.

GENERAL ELECTRIC CO., Air Conditioning Dept., 5 Lawrence St., Bloomfield, N. J.—Booth 601

In attendance: M. J. Hackney, H. N. McMenimen, Jr., R. J. Walsh, E. V. Whiteley.

Exhibiting: Residential heating equipment; year 'round air conditioning; central plant air conditioners; condensing units. Multi-room air conditioning system for office buildings and hotels and year 'round air conditioning for homes will be featured.

GENERAL FILTERS, INC., 12890 Westwood Ave., Detroit 23, Mich.—Booth 415

In attendance: Robert G. Gregory, Roland A. Redner, Mrs. Grace Redner.

Exhibiting: Three models of fuel oil filters, and featuring large capacity filters for fuel oil.

GENERAL FITTINGS CO., 123 Georgia Ave., Providence 5, R. I.—Booth 434

In attendance: Horace F. Horton, Jack Jones, Lynn Roberts, John J. Cotter, Vaughn Gooding, Charles A. Maine, Bill Simms, Bob Hull.

Exhibiting: Tankless water heaters; industrial instantaneous water heaters; thermostatic mixing valves; "Testite" solder fittings; water hammer silencers. New all-copper tankless heater with fiber glass insulation and metal outer jacket will be featured.

GENERAL MOTORS CORP.—see FRIGIDAIRE DIV.

GENERAL PLATE DIV.—see METALS & CONTROLS CORP.

GENERAL REFRIGERATION DIV., YATES-AMERICAN MACHINE CO., Beloit, Wis.—Booth 719

In attendance: Jack Gallagher, Clark F. Oliver, Clarence H. Smith, Harold Hayhurst.

Exhibiting: Home air conditioner; room air conditioner; store air conditioner.

GLASFLOSS DIV., TILO ROOFING CO., INC., 155 E. 44th St., New York 17, N. Y.—Booth 447

In attendance: R. R. Pryor, H. M. Rudio, W. E. Grasberger, B. J. Brady.

Exhibiting: Throwaway filters (metal frame and chipboard type). A metal frame throwaway air filter made with glass fibers is a new product.

GOODFELLOW CO., INC., E. D., 496 E. Bodley St., Memphis 2, Tenn.—Booth 222

In attendance: F. E. Conaway, R. S. Stover, C. E. Goodfellow, E. D. Goodfellow.

Exhibiting: Induced draft cooling towers. Centrifugal fan cooling towers in sizes from 5 to 50 tons capacity, available with or without "Uni-drive", have been added to the line.

GOVERNAIR CORP., 513 N. Blackwelder, Oklahoma City, Okla.—Booth 934

In attendance: William H. Hollingsworth, W. A. Quinn.

Exhibiting: Twin 20 ton completely packaged air conditioner, evaporative condenser, cooling tower, coils.

GREENLEE TOOL CO., 2136 Twelfth St., Rockford, Ill.—Booth 809

In attendance: Ray Samuelson, Adolph Hawkinson, George Walter Davis, Andrew Kirby, George Krause, Ben Halliday, Bill Spear.

Exhibiting: Mechanical and hydraulic benders for radiant heating and other purposes operated by hand and power; woodboring tools for boring holes for pipe by hand or with power; auger bits, car bits, chisels, gouges, draw knives, hand and power driven knockout punches, multi-spur machine bits, and mortising, boring and routing tools. An automatic power driven bender that bends 5 in. pipe or conduit to 90 deg in 2 min will be shown.

GRINNELL CO., INC., 260 W. Exchange St., Providence 1, R. I.—Booth 531

Exhibiting: Pipe hangers, pipe fittings, welding fittings, constant support hangers, "Thermolier" unit heaters, prefabricated piping, diaphragm valves, spring hangers.

GUSTIN-BACON MFG. CO., 1412 W. 12th, Kansas City 7, Mo.—Booth 736

In attendance: J. B. Weltmer, M. F. Hauserman, Jr., R. C. Harden, R. L. Harden, Barth Gilcrist.

Exhibiting: "Ultralite" duct insulation and duct liner. A practical demonstration of the sound absorbing characteristics of the duct liner and a unique way of applying both the duct liner and duct insulation will be shown.

HARRIS & CO., ARTHUR, 212 N. Aberdeen St., Chicago 7, Ill.—Booth 326

In attendance: George C. Harris.

Exhibiting: Copper and stainless steel floats.

HART & COOLEY MFG. CO., 500 E. 8th St., Holland, Mich.—Booth 609

In attendance: R. W. Blanchard, G. D. Heeringa, Miss Irma F. Zeeb, J. H. Van Dyke, E. J. Rowder, Howard H. Eddy, Richard Smeenge, Fred H. Heads.

Exhibiting: Complete line of registers, grilles and furnace accessories for warm air heating and air conditioning systems. A register with a turning blade valve, and a ceiling outlet—newest addition to the line—will be featured. The year 1951 marks the exhibitor's 50th anniversary, and this will be pointed up in the exhibit.

HEATING, PIPING & AIR CONDITIONING, 6 N. Michigan Ave., Chicago 2, Ill.—Booth 12

In attendance: Frank P. Keeney, Chas. E. Price, Wallace J. Osborn, Robert A. Jack, C. M. Burnam, Jr., George C. Cutler, James D. Thomas.

Exhibiting: Heating, Piping & Air Conditioning magazine; market information.

HEATING & VENTILATING, 148 Lafayette St., New York 13, N. Y.—Booth 48

Exhibiting: Publication.

HEAT-TIMER CORP., 520 Broadway, New York 12, N. Y.—Booth 735

HEIL CO., 3000 W. Montana St., Milwaukee 1, Wis.—Booths 93 & 97

In attendance: J. F. Heil, H. F. Pugh, D. E. Fricker, A. F. Meyer, W. E. Simons, George Hochstein, Roy King, Karll Mould, Fred Brubaker, John Barclay, John Ballard, Wm. Chester, Jr., J. F. Heil, Jr.

Exhibiting: Oil fired and gas fired units.

HENRY FURNACE CO.—see C. A. OLSEN MFG. CO.

HERSHEY MACHINE & FOUNDRY CO.—see MOTORSTOKER DIV.

HOFFMAN SPECIALTY CO., 1001 York St., Indianapolis 7, Ind.—Booth 235

In attendance: W. W. Dillon, N. D. Skinner, R. J. McCracken, A. O. Roche, Jr., F. Jehle.

Exhibiting: Venting valves, thermostatic traps, float and thermostatic traps, bucket traps, pressure reducing valves, temperature regulators, water control systems, vacuum and condensation pumps.

HOLLY MFG. CO., 875 S. Arroya Pkwy., Pasadena, Calif.—Booth 835

In attendance: J. Stanley Johnson, Fred C. Farmer.

Exhibiting: Gas fired "Stubby" floor furnaces and "NarroWall" recessed wall heaters, with secondary heat exchanger (AGA approved).

HOMEASE PRODUCTS CO., 52 Iowa Ave., Paterson 3, N. J.—Booth 628
In attendance: Robert R. Birkins.
Exhibiting: Oil burners.

HOOK & ACKERMAN, INC., 18 E. 41st St., New York 17, N. Y.—Booth 703
In attendance: H. D. Staman, W. F. Hosmer, John F. Baier, H. S. Ackerman.
Exhibiting: "Hydrotherm" gas fired boilers, featuring "Midget" unit for individual apartment heating, with 45,000 Btu input and suitable for suspended installation.

ILG ELECTRIC VENTILATING CO., 2850 N. Crawford Ave., Chicago 41, Ill.—Booth 310
In attendance: C. W. Smith, S. D. Stewart, W. T. Trowbridge, G. A. Innes.
Exhibiting: Built-in "Ilgette" kitchen fan, 10 in. ceiling kitchen fan, 8 in. package kitchen fan, "Ilgdualaire" night cooling fan, propeller fan, explosionproof propeller fan, power roof ventilators, centrifugal fans, steam unit heater, electric unit heater, gas unit heater. New power roof ventilator and 8 in. special "New York Life Manhattan House" package kitchen fan will be featured.

ILLINOIS ENGINEERING CO., Racine Ave. & 21st St., Chicago 8, Ill.—Booth 49
In attendance: Robert L. Gifford, Jas. C. Matchett, Gordon L. Harris, J. L. Ehretsman, R. W. Leutwiler, Louis Huyette, Walter Edge, Phil Wood.
Exhibiting: Glass model of steam trap operating under steam; recording instrument performance of a float and thermostatic trap draining a unit heater under steam; complete control panels and cabinets for control systems; general line of heating specialties for vacuum and vapor systems. New developments in automatic steam and fluid control equipment will be featured.

ILLINOIS TESTING LABORATORIES, INC., 420 N. La Salle St., Chicago 10, Ill.—Booths 624-626

IMPERIAL BRASS MFG. CO., 1200 W. Harrison St., Chicago 7, Ill.—Booths 435-437
In attendance: C. H. Benson, F. McNellis, Jr., E. F. Todd, K. Waugh, T. A. Byrnes.
Exhibiting: Flared, compression, "Hi-Duty" and brass pipe fittings; tube fittings for LP-gas; refrigeration flared tube fittings; refrigeration valves; refrigeration driers; shutoff valves; tubing tools; soldering and welding equipment. Improved gear type tube benders, new liquid indicators for refrigeration applications, and new charging lines for refrigeration applications will be featured.

INDEPENDENT REGISTER CO., 3747 E. 93rd St., Cleveland, Ohio—Booth 801
In attendance: K. B. Solberg, A. H. Ullman, B. N. Richardson.
Exhibiting: Registers and grilles for warm air heating, ventilating and air conditioning.

INDUSTRIAL VAN PACKER CORP., 612 First National Bldg., Davenport, Ia.—Booth 248
In attendance: J. M. Hemingway, M. W. Langan, Leo Coleman.
Exhibiting: Industrial chimney "which requires no maintenance and never requires painting, and which features higher combustion efficiency, less smoke, better draft with lower height, and fuel savings."

INGERSOLL PRODUCTS DIV., BORG-WARNER CORP., 760 E. Vine St., Kalamazoo, Mich.—Booths 236-240-244
In attendance: Frank J. Nugent, Howard Limbacher, W. B. Johnson, Paul Fetzek, James Neall, Larry Hodge, G. Huston, Kendall Flint, C. Baker, L. Hershey, R. A. Anderson.
Exhibiting: Gas winter air conditioners, gas conversion burners, oil conversion burners, oil gravity furnaces, oil winter air conditioners, coal winter air conditioners, coal gravity furnaces, and featuring cutaway model of heavy gage "Wedgetube" heat exchanger and new series of gas fired winter air conditioners.

INGERSOLL-RAND CO., Phillipsburg, N. J.—Booth 931
In attendance: G. H. Gavin, B. P. Gilmore, J. F. Finger, A. L. Keeler, R. J. Dodge, R. E. Allen, W. P. VanEps, Jr., R. S. Johnson, T. E. Bond, W. W. Cramer, J. L. Carpenter, J. M. Wells, S. S. Orben, S. B. Wolfe, Jr.
Exhibiting: Compressors and electric "Impactools." "Motorpump" line for air conditioning and heating applications will be featured.

INSULATING CONCRETE CORP., 3100 K St. N. W., Washington 7, D. C.—Booth 443

INTERNATIONAL HEATER CO., 101 Park Ave., Utica 2, N. Y.—Booth 729
In attendance: I. C. Barber, C. T. Moyer.
Exhibiting: "Oil Economy" oil fired winter air conditioning units, one for utility room and the other for basement installation; "Gas Economy" winter air conditioning unit for utility room or basement installation; boiler-burner unit; gas conversion burner. The gas winter air conditioning unit, the gas conversion burner and the boiler are new products recently added to the line.

IRON CITY CHEMICAL CO., Valencia, Pa.—Booth 441
In attendance: Robert G. Schmidt, George C. Hein, Geza Orley, John P. Galvin.
Exhibiting: "Glycolator" vaporizers which disperse triethylene glycol to kill airborne bacteria. Two new units, both portable, one a small home unit and the other for institutions, will be featured as will units which attach to furnaces and commercial glycol vaporizers for central air conditioning systems.

IRON FIREMAN MFG. CO., 3170 W. 106th St., Cleveland 11, Ohio—Booths 39 & 59

JACKSON & CHURCH CO., 321 N. Hamilton, Saginaw, Mich.—Booth 80
In attendance: D. L. Perrot, L. S. Redford, O. J. Murphy, B. R. Bremer, F. E. Young, F. C. Adams, Howard K. Beck, C. J. Low, R. H. Beeman, Alton Roth.
Exhibiting: "Poweraire", "Powerated" and suspended furnaces and heaters, and "4 in 1" unit.

JACOBS & SONS, LIONEL L., 126 W. Wayne Ave., Wayne, Pa.—Booth 140
In attendance: Lionel L. Jacobs, Bruce L. Jacobs, Earl Fountain, Robert Miller.
Exhibiting: "Brandenburg Basepanel" convector radiation, "Pentwater" fuel oil pumps, miscellaneous controls and accessories, and featuring applications of "Basepanel" radiation to housing developments.

JEFFERSON ELECTRIC CO., Bellwood, Ill.—Booth 336
In attendance: C. T. Harnett.
Exhibiting: Oil burner ignition transformers.

JENKINS BROS., 100 Park Ave., New York 17, N. Y.—Booth 30
Exhibiting: Valves; discs; friction and rubber tapes. Bronze rapid action, lever operated gate valve, called "Swingtite"; 500 Brinell plug and seat bronze globe, "for tough services" to 300 lb steam; and bronze globe "suitable for 90 percent of industrial piping" will be featured.

JENN AIR PRODUCTS CO., 333 N. Pennsylvania Ave., Indianapolis 4, Ind.—Booth 421
In attendance: L. J. Jenn.
Exhibiting: Air exhausters, featuring wall type models for use where roof units are not practical or easily installed.

JOHNSON SERVICE CO., 507 E. Michigan St., Milwaukee 2, Wis.—Booths 82-81
In attendance: M. M. Herrick, E. F. Tate, D. S. Plewes, D. B. Whalen, G. A. Lillie, H. E. Kiefer, N. J. McGee, W. W. Hill, E. K. Schultz, Jr.
Exhibiting: Automatic temperature and air conditioning control systems, with equipment shown in actual operation. Small control valves for convectors and unit air conditioners; "Master-Submaster" control for unit ventilators; and "Record-O-Stat" recorder-controller will be featured.

JOY MFG. CO., Henry W. Oliver Bldg., Pittsburgh 22, Pa.—Booth 517
In attendance: R. Mancha, R. A. Heindel, C. L. Tinker, C. W. Miller, C. R. Hiers, J. F. Fitchie.
Exhibiting: Fans.

KAUSTINE CO., INC., Perry, N. Y.—Booth 321
In attendance: J. B. Mollnow, Sr., J. B. Mollnow, Jr., Willard Stahl, Russell Preine.
Exhibiting: Oil fired winter air conditioners.

KEENEY PUBLISHING CO., 6 N. Michigan Ave., Chicago 2, Ill.—Booth 12
In attendance: Frank P. Keeney, Chas. E. Price, Wallace J. Osborn, Robert A. Jack, C. M. Burnam, Jr., George C. Cutler, James D. Thomas, John E. Peterson.
Exhibiting: Heating, Piping & Air Conditioning magazine; American Artisan magazine; market information.

KENT CO., INC., 103 Canal St., Rome, N. Y.—Booth 419
In attendance: C. E. Clifford, George Davis, Joe Hugues, Phil T. Hugues, Paul Young, Sam Ruch.
Exhibiting: Double suction furnace and boiler cleaner.

KEWANEE BOILER CORP., Franklin and "Q" Tracks, Kewanee, Ill.—Space "A"
In attendance: Ben H. Schulze, J. M. Hartman, H. W. McClure, Karl Rugart, T. F. Maher, E. J. Lambrecht, Charles Schutz, James Kerin, Harry W. Doerrfuss, Curtis H. Wells, Henry Makin, George Gilmour, William J. Robinson, Dayrel G. Hoke.
Exhibiting: Welded boiler for low pressure steam or hot water heating shown as an actual sawed-in-two section of the 8500 sq ft size; "Square-Heat" boiler, representative of a series of eight sizes, for heating medium size buildings and equipped with a domestic hot water coil for storage tank operation; round boiler in new enclosing jacket for heating homes or small buildings; "Cottage" boiler, which is newest addition to exhibitor's residential line and will be shown for the first time at any heating show.

KOVEN & BRO. INC., L. O., 154 Ogden Ave., Jersey City 7, N. J.—Booth 50
In attendance: A. R. Hanson, E. Wodecka.
Exhibiting: "Venko" model for small homes, "Deluxe Waterfilm" for larger homes, and featuring new packaged oil burner unit for smaller homes.

KO-Z-AIRE, INC., [illegible]01 Coolbaugh St., Red Oak, Ia.—Booth 825
In attendance: John J. Hildebidle, Richard T. Demarest, Edward Lambert, Leonard White, Jack Bennett, Arthur Hicks, George Johnson, Lin Krause, Arthur Nugent, Dan Banner.
Exhibiting: Gas and oil fired counterflow, "Lo-Boy" and "Hi-Boy' winter air conditioners; gravity furnaces; conversion gas burners. New counterflow oil and gas forced air units for perimeter heating and new conversion gas burner with single port burner will be featured.

KRESNO-STAMM MFG. CO. (AMERICA) INC., 345 Commercial Ave., Palisades Park, N. J.—Booth 822

KRITZER RADIANT COILS, INC., 2901 W. Lawrence Ave., Chicago 25, Ill.—Booth 710
In attendance: M. W. Knight, C. G. Newton, C. C. Schedler, R. E. Burke, M. W. Blankin.
Exhibiting: Radiant coils, baseboard radiation,

commercial fin pipe coils, baseboard convectors. Simplicity in installation is the keynote of these products, "comes through having a prefabricated radiant finned tube coil with all necessary accessories for easy installation." The baseboard coil has such features as a built-in hanger attached to the backplate.

LAU BLOWER CO., 2001-2029 Home Ave., Dayton 7, Ohio—Booth 533
In attendance: E. B. Lau, T. I. Byrd, H. W. Faulkender, E. V. Sullivan, J. Burrowes, C. Miley, E. Wolford, E. Humphrey, J. Wallace, W. Lohrey.
Exhibiting: Blower wheels, pulleys, pillow blocks, blower housings and assemblies, industrial and commercial exhaust fans, window exhaust fans, portable fans. Single inlet direct drive blower assembly, double inlet direct drive blower assembly, and new portable window fan (exhaust or intake) for use in casement windows will be featured.

LESLIE CO., Lyndhurst, N. J.—Booth 32
Exhibiting: Pressure and temperature regulators and controllers for space heating and air conditioning applications. Pressure regulators and controllers capable of one step pressure reductions over a wide range of inlet pressures, with hardened stainless steel trim and stellited valve seating surfaces, will be featured, as will a new self-contained temperature regulator for hot water service.

LEWIN-MATHES CO., 1111 Chouteau Ave., St. Louis 2, Mo.—Booth 113

LEWIS & CO., INC., JOSEPH E., 1303 Carroll St., Baltimore 30, Md.—Booth 715
In attendance: J. R. McDonald, T. E. Dryden, J. C. Fullerton, Joseph Tobin, H. R. Oesterling, Jack Dawson, George Derbyshire, Lou Mack.
Exhibiting: "AquaHeater" tankless water heater.

LIBBEY-OWENS-FORD GLASS CO., Toledo 3, Ohio—Booth 132

LIMA REGISTER CO., 651 N. Baxter St., Lima, Ohio—Booth 348
In attendance: Henry R. Pataky, Ray Boland, Russ Morey, C. J. LeMaster.
Exhibiting: Registers and grilles for warm air heating and air conditioning. New floor diffuser, especially designed for perimeter heating, will be featured.

LINDY HEATERS, 2370 Hoffman St., New York 57, N. Y.—Booth 633
In attendance: Lawton R. Moray, Otto Lindy, August Weiland, Alan Gasner, Louis Friedman.
Exhibiting: Tankless and storage type indirect hot water heaters for external or internal installation in steel or cast iron heating boilers, heat exchangers, flexible union connectors, condensate coolers and preheaters.

LIQUIDEPTH INDICATORS, INC.—see PETROMETER CORP.

LIQUIDOMETER CORP., 41-03 36th St., Long Island City 1, N. Y.—Booth 426
In attendance: W. C. Armstrong, J. J. Cosgrove.
Exhibiting: "Liquidometer" and "Levelometer" gages for indicating direct and remote tank contents. Dial instruments utilize hydraulic, electric or hydrostatic transmission systems. Direct reading gages are straight mechanical.

LOCKFORMER CO., 4615 W. Roosevelt Rd., Chicago 50, Ill.—Booth 45
In attendance: George W. Lamberson, Harold G. Flagler, Edward C. Bill, John Davis.
Exhibiting: "Lockformer #20", "Lockformer #24" with power flanging attachment; "Cleatformer".

LYCOMING-SPENCER DIV., AVCO MFG. CORP., 642 Oliver St., Williamsport, Pa.—Booth 148
In attendance: E. I. Boardman, R. S. Brenan, J. C. Ickeringill, J. H. Smith, Jr., H. A. Johnson, D. Reinhardsen, D. J. Falk.
Exhibiting: Cast iron and steel heating boilers for residential and low pressure commercial systems.

MAID-O'-MIST INC., 3217 N. Pulaski Rd., Chicago 41, Ill.—Booth 648
In attendance: William J. Woolley, O. V. Woolley, H. J. Carr, N. F. Sorgenfrei, William Bunten, Paul Bunten, E. E. Berthet, E. Busch, George Hench, A. Aguer, William Walter, J. McEntee, J. O'Connor, R. Thorne.
Exhibiting: Automatic humidifiers for steam and hot water radiators, warm air furnaces and related items, new air valves for hot water heating systems, new balancing valves for hot water heating systems, water line float control valves, new boiler feeders and cutouts.

MARIETTA METAL PRODUCTS CORP., 540 N. 63rd St., Philadelphia, Pa.—Booth 58
In attendance: John Hancock, Arnold E. Blitz, Paul Commaker, Ralph Richards, Richard Klotz, Joseph Meyers.
Exhibiting: Oil fired boilers; burners; boiler burner units. "Magic Heat" boilers, burners, circulators, etc., will be featured.

MARLEY CO., INC., Fairfax and Marley Rds., Kansas City 15, Kans.—Booth 37
In attendance: L. A. Christensen, J. A. Cameron, Walter L. Clark, Roy W. Maze, F. B. Reed, R. M. Sharp, J. J. Laitmon, J. P. Ketcham, K. W. Oakley, H. P. Rodgers, Walter A. Broll, Dale Truscott.
Exhibiting: Scale model of "Double-Flow" cooling tower; "Aquatower" packaged cooling tower; cooling tower mechanical equipment.

MARLO COIL CO., 6135 Manchester, St. Louis 10, Mo.—Booths 3 and 5
In attendance: C. D. Marlo, A. T. Marlo, L. C. Pellegrini, H. R. Iverson, K. Wicks, Richard K. Hunter, Howard Caton, Walter B. Moses, Jr., George E. Roepke.
Exhibiting: Induced draft cooling towers, evaporative condensers, zone type air conditioners, remote type room coolers, blast cooling and heating coils.

MARSH HEATING EQUIPMENT CO., 3501 Howard St., Skokie, Ill.—Booth 444
In attendance: James Emmett, Jr., William M. Ensign, R. E. Barnett, Howard Lavaty, S. C. Kauffman.
Exhibiting: Radiator traps and valves, float and thermostatic traps, vents, heating controls, gages, thermometers, condenser water regulators, solenoid valves.

McCORD CORP., 2587 E. Grand Blvd., Detroit 11, Mich.—Booths 318-320

McDONNELL & MILLER, INC., 3500 N. Spaulding Ave., Chicago 18, Ill.—Booth 331
In attendance: E. N. McDonnell, Nils W. Swanson, George La Roi, J. W. Ramsey, Howard Peary, Parker Devlin, John James, Al Behrens, Dick Berry, Russ Evans.
Exhibiting: Safety devices for steam and hot water heating boilers, including boiler water feeders, low water fuel cutoffs, pump controllers, safety relief valves, special float switches, and float valves. New high pressure Btu rated safety relief valves for domestic hot water heating systems and new explosion-proof electric controllers will be featured.

McQUAY, INC., 1600 Broadway, N.E., Minneapolis 13, Minn.—Booths 803-805

MERCOID CORP., 4201 Belmont Ave., Chicago 41, Ill.—Booth 13
In attendance: Hugh Courteol, J. W. Owens, W. Coulterjohn, R. F. Fisher, W. K. Stauffer, F. W. Ayer, John Sheddon, J. W. Johnson, I. E. McCabe, J. F. McCauley, K. Reiley.
Exhibiting: Complete line of automatic controls for heating, air conditioning, refrigeration and various industrial requirements.

METAL CARRIER CORP., 1750 Alpine Ave., N. W., Grand Rapids 4, Mich.—Booth 316
In attendance: M. C. Weiner, L. Lobdell, L. F. Oberman.
Exhibiting: Heating and air conditioning registers and grilles.

METALS & CONTROLS CORP., SPENCER THERMOSTAT DIV. & GENERAL PLATE DIV., 34 Forest St., Attleboro, Mass.—Booth 514
Exhibiting: "Klixon" controls, including overheat protectors and starting relays; precious and composite metals.

METROMATIC MFG. CO., 21 Henderson St., Everett 49, Mass.—Booth 139
In attendance: B. W. Cosentino, Wendell Austin, Robert W. Pyne, Albert J. Axtman, Frank X. Pyne, Howard Hall, Arthur Seitz, Jr., Joseph Sweeney, Emery Currier, William MacAdams, Jr.
Exhibiting: "Metropac" forced warm air furnace; "Strate Aire" furnace; oil burners. Economy Model S1 features forced warm air for winter heating and domestic hot water year 'round in a unit "attractively priced for low cost homes."

MID-CONTINENT METAL PRODUCTS CO., 1960 N. Clybourn Ave., Chicago 14, Ill.—Booth 210
In attendance: A. F. Zitzewitz, C. F. Petersen, E. W. Haedike.
Exhibiting: "Lo-Blast" and "Economite" gas burners of the power type. Exhibit will demonstrate "heating of all sizes and types of buildings, from cottages to skyscrapers."

MILWAUKEE GAS SPECIALTY CO., 730 N. Jackson St., P. O. Box 461, Milwaukee, Wis.—Booth 544

MINNEAPOLIS-HONEYWELL REGULATOR CO., 2753 4th Ave. S., Minneapolis 8, Minn.—Booths 948-950
In attendance: T. McDonald, A. H. Lockrae, J. E. Haines, C. D. Lyford, J. S. Locke, H. D. Bissell, J. A. Young, Kent Wilson, Karl Schick, H. E. Chapler, R. R. Moore, Henry Carlsen, T. Reed, V. D. Wissmiller, E. F. Snyder, R. W. Crysler, R. H. Jacobs, J. F. Cummiskey, H. R. Canoyer, L. B. Belford, L. S. MacGann, A. H. Koch, D. J. Petersen, C. C. Cochran.
Exhibiting: Air measuring and recording instruments; water circulators; low water cutoffs; damper regulators; dampers; humidity recorders and indicators; recording and indicating instruments; pyrometers; humidity and temperature recorders; refrigeration controls; registers; thermostats; transformers; valves.

MITCHELL MFG. CO., 2525 N. Clybourn Ave., Chicago 14, Ill.—Booth 57
In attendance: Bernard A. Mitchell, E. A. Tracey, L. H. Solomon, H. G. Haas, John Jennings.
Exhibiting: Room air conditioners of several models. One-third ton window unit will be featured.

MODINE MFG. CO., 1509 DeKoven Ave., Racine, Wis.—Booth 532
In attendance: Harry J. Clark, R. D. Bitzer, W. L. Kerst, A. F. McGovern, O. E. Desmond, W. R. McMahon, M. J. Druse.
Exhibiting: Unit heaters, convectors and coils, and featuring cabinet units for heating or cooling and picture window convectors.

MONARCH MFG. WORKS, INC., 2501 E. Ontario St., Philadelphia 34, Pa.—Booth 900
In attendance: T. W. Murphy, E. B. Frame, J. M. Carroll, R. F. Stone, C. E. Fink.
Exhibiting: Oil burner nozzles and accessories, air conditioning nozzles and strainers. New high efficiency "Combustion Head" under fire will be featured.

MORRISON PRODUCTS, INC., 16816 Waterloo Rd., Cleveland 10, Ohio—Booth 632

MORRISON STEEL PRODUCTS, INC., 601 Amherst St., Buffalo 7, N. Y.—Booth 23
In attendance: Gene Brown, John K. Farrar, Samuel S. Neide, Herbert G. Miller.
Exhibiting: "Mor-Sun" counterflow forced warm air furnace for perimeter heating, conversion gas burner, basement type "Toaster" model furnace, gravity furnace. The counterflow models for both oil and gas have been

developed to handle the increasingly popular perimeter system of forced warm air heating, "are completely die stamped and mass produced on modern automotive principles."

MORSE-SMITH-MORSE INC., 165 Dexter Ave., Watertown 72, Mass.→Booth 725
In attendance: R. E. Chase, J. C. Dieselman.
Exhibiting: Fusible oil valves, oil filters, thermal switches, tank gages and vent caps.

MOTORSTOKER DIV., HERSHEY MACHINE & FOUNDRY CO., Manheim, Pa.—Booths 147, 150, 432
In attendance: A. T. Bertolette, J. D. Wentz, H. D. Merrill, R. L. Loomis, J. F. Fisher, F. L. Cassel, C. H. Olandt.
Exhibiting: Coal and oil fired warm air furnaces; boiler units; conversion stokers; conversion oil burners. New package units (coal and oil fired) will be featured.

MUELLER FURNACE CO., L. J., 2005 W. Oklahoma Ave., Milwaukee 15, Wis.—Booths 304-308
In attendance: H. P. Mueller, Sr., H. P. Mueller, Jr., C. L. Hewitt, Jr., F. J. Nunlist, H. B. Smith, L. N. Zimmerman, Leroy Walker, Chet Gollings, Larry McCann, Ray Clewell, Edward Vanderhaven, L. C. Stone, Edward O'Connell, Harry Schink, Paul Thompson, Carl Ferris, Tom Halligan, James Edgar, Fred Seiden.
Exhibiting: Gas and oil fired heating and winter air conditioning equipment, including gravity and forced air units, gas boilers, gas unit heaters, gas horizontal furnaces and gas and oil conversion burners. "Type 110" gas fired winter air conditioner, available in white enamel or green crinkle lacquer, making it suitable for utility room or basement installation, designed with all-welded, steel heat exchanger and fired by drilled-port, cast iron burner and available in range of five sizes with Btu inputs of 60,000 to 160,000, will be featured.

MULTI-VENT DIV.—see PYLE-NATIONAL CO.

NASH ENGINEERING CO., South Norwalk, Conn.—Booth 400

NATIONAL RADIATOR CO., 221 Central Ave., Johnstown, Pa.—Booth 133
In attendance: C. M. Baumgardner, L. N. Hunter, B. T. Hain, J. W. LeRoy, P. J. Bracken, P. A. Formel, J. H. Johnston, J. Zidalis, F. R. Kriebel, L. M. Lyall, Jr., W. J. McDougal, G. T. Moran, C. A. Piez, M. R. Roberts, M. M. Taylor, A. J. George, R. S. Doherty, J. W. Hall, H. W. Williams, K. O. Schlentner, C. J. Philage, A. K. Tinker, G. A. Baerenklau, F. W. Eichler, P. J. Gerdon, S. G. Haynes, A. R. Herske, R. A. Schmicker.
Exhibiting: 100 and 200 series "National Heat Extractor", residential steel boiler, gas boiler, "Art" radiators, "Aero" and "Art" convectors, "Art" baseboard, unit heaters, "NRC" fin tube convector, heating accessories. The "National Packet"—an all-in-one automatic home heating unit, providing heat and domestic hot water, with boiler, burner, accessories and controls factory-assembled in a single crate and available with enclosing cabinet or flush jacket; "Art" baseboard, a nonferrous heating unit for flush with wall (BF) or recessed (BR) installations; and unit heaters for horizontal or downflow (vertical) air delivery, will be featured.

NELSON DIV., HERMAN, AMERICAN AIR FILTER CO., INC., 1824 Third Ave., Moline, Ill.—Booths 902-906
In attendance: Robert W. Nelson, Charles S. Stock, Morris G. Munson, W. N. Murray, Donald Strause, F. T. Carroll, Jr., S. T. Carlton, C. A. Pickett, Robert F. DeLay.
Exhibiting: "Draft Stop" unit ventilator and utility cabinets; convector; horizontal shaft propeller fan type unit heater; vertical shaft propeller fan type unit heater; propeller fan, unit blower.

NESBITT, INC., JOHN J., Holmesburg, Philadelphia 36, Pa.—Booth 814
In attendance: John J. Nesbitt, Jr., Albert J. Nesbitt, T. M. Reed, Jr., W. D. Widerman, E. A. Grostas, K. W. Will, H. B. Hedges.
Exhibiting: Schoolhouse unit ventilator integrated with open and closed storage cabinets.

NEW YORK BLOWER CO., 32nd St. & Shields Ave., Chicago 16, Ill.—Booth 540

NIAGARA BLOWER CO., 405 Lexington Ave., New York 17, N. Y.—Booth 910

NIAGARA FURNACE DIV., FOREST CITY FOUNDRIES CO., 2500 W. 27th St., Cleveland 13, Ohio—Booth 77
In attendance: I. E. Seith, R. H. Leisenheimer, Walter Kremser.
Exhibiting: Warm air furnaces and winter air conditioning units, cast iron and steel; also "Hi-Boys", including new apartment size model.

NIAGARA MACHINE & TOOL WORKS, 637-697 Northland Ave., Buffalo 11, N. Y.—Booth 926
In attendance: L. L. Hock, F. L. Kelsey.
Exhibiting: Squaring shears, rotary shears, bar folder, slip roll former, rotary machines, hand tools. Multi-drive table furnishing drive to miscellaneous crimpers, beaders, flangers, elbow edgers, etc., will be featured.

NORGE HEAT DIV., BORG-WARNER CORP., 672 E. Woodbridge, Detroit 26, Mich.—Booth 501
In attendance: E. J. Effinger, L. J. Studnicky, J. W. Pulkinghorn, H. W. Ford, S. F. Potter, M. A. Straub, H. K. Leussler, W. C. Walter, L. L. Groff, J. M. McNamara, C. S. Davis, Jr.
Exhibiting: Oil fired "Hi-Boy", "Lo-Boy" and horizontal winter air conditioning furnaces; gas fired "Hi-Boy", "Lo-Boy" and horizontal winter air conditioning furnaces; gas and oil fired boilers; gas and oil fired water heaters; oil fired floor furnaces; gas gravity furnaces.

NORMAN PRODUCTS CO., 1150 Chesapeake Ave., Columbus 12, Ohio—Booth 850
In attendance: Edward A. Norman, Jr., D. D. Piper, Russell G. Dawley, C. A. Reichelderfer, D. A. Ruen, G. P. Mandel, W. R. Sundermeyer.
Exhibiting: Conversion burners; "Southerner" horizontal furnace; gas designed furnaces; commercial-industrial burners; forced convection heater; "Twinfuel" burners and furnaces. The forced convection heater will be featured.

OLSEN MFG. CO., C. A., Elyria, Ohio—Booth 70
In attendance: C. A. Olsen, Edward P. Hayes, James Crombie, E. R. Downe, C. L. Grandstaff, E. J. Marre, Jr., J. P. Cullin.
Exhibiting: Warm air furnaces and winter air conditioning units for oil, gas and coal.

OWENS-CORNING FIBERGLAS CORP., Nicholas Bldg., Toledo, Ohio.—Booths 206-208
In attendance: C. L. Rolwey, R. E. Trumbull, F. B. Graper, D. M. Browne, W. R. Thomas, W. B. Dias, J. R. King, E. E. Morris, M. H. Owen.
Exhibiting: Filters; coated and flexible type duct insulation; thermal and acoustical insulation for warm air furnaces and air conditioning units. New lightweight and easily erected filter holding frames and foil-faced insulation for use in warm air furnaces will be featured.

PACIFIC STEEL BOILER DIV., UNITED STATES RADIATOR CORP., 300 Buhl Bldg., Detroit 26, Mich.—Booth 909
In attendance: E. J. Grady, H. B. Steggall and managers and personnel of the New York and Philadelphia sales offices.
Exhibiting: Boiler with jacket, plate flue boiler, round boiler, animated display of split firebox boiler.

PATTEN CO., J. V., Sycamore, Ill.—Booth 608
In attendance: Don C. Patten, John H. Patten, A. A. Boyle, Shepard Herman, C. W. Porter, Bernard Zwerling, Alfred Chaplin, Seymour Zwerling.
Exhibiting: "Sun Fuel-Master Heatrap", a newly designed low cost furnace utilizing primary surfaces to the greatest possible extent.

PATTERSON KELLEY CO., INC., Burson St., East Stroudsburg, Pa.—Booth 525
In attendance: F. L. Patterson, Jr., A. B. Grotz, O. J. Pedersen, William Wilson, C. E. Drake, Leonard F. Lowe.
Exhibiting: Two-circuit dry expansion type "Freon" cooler; heat exchangers and convertors; "Freon" condenser of fin tube construction.

PENN ELECTRIC SWITCH CO., Goshen, Ind.—Booth 433
In attendance: Carlos Morgan, A. L. Rubel, George Sander, R. V. Clark, E. B. Maire, R. S. Penn, F. X. Fessler, J. E. Corbett, W. S. Lossie, M. E. Henning, James Moravec, A. W. Barr, K. W. Cash, R. H. Luscombe, R. L. Persons, H. C. Shilling, E. A. Price.
Exhibiting: Heating and cooling room thermostats, humidistats, day-night "Tem-Clock" hot water and warm air temperature controls, steam pressure controls, relays and relay transformers, oil burner stack switches, stoker timers, damper motors, refrigeration temperature and pressure controls, water valves and solenoid valves, gas heating controls. Type 442 hot water immersion control with liquid expansion temperature elements providing close temperature control for hot water heating systems will be featured.

PENNSYLVANIA FURNACE & IRON CO., 316 Pine St., Warren, Pa.—Booth 204
In attendance: R. L. Blodgett, C. S. Andersen, H. J. Harvey.
Exhibiting: Gas fired winter air conditioning furnaces, gas fired gravity furnaces, gas conversion burner, gas fired steam vapor and water boilers.

PENTWATER MACHINERY CO., Pentwater, Mich.—Booth 221

% PROPORTIONEERS, INC. %, 345 Harris Ave., Providence 1, R. I.—Booth 55

PERFECTION STOVE CO., 7609 Platt Ave., Cleveland 4, Ohio—Booth 200
In attendance: E. B. Goodwin, S. C. Reese, R. A. Walls, William R. Wright, Jr., Roy Brigance, W. M. Russell, William Potter, Harold Dean.
Exhibiting: "Superfex" suspended oil furnace, gravity gas furnace, Model 66 "Homogenaire" gas furnaces, "Hi-Boy" oil furnace; oil conversion burner; electric water heater; storage type oil burning water heater. Three-stage conversion gas burner for old furnaces fired with solid fuels and 80,000 Btu gas floor furnace will be featured.

PERFEX CORP., 300 W. Oklahoma Ave., Milwaukee 7, Wis.—Booths 707-709
In attendance: C. E. Lewis, V. P. Black, V. R. Tate, Allen Butler, J. W. McGuire, D. DeVos, R. Blackhall, P. F. Neess, R. E. Toellner, H. D. Cook, E. Spall, M. Bowman, J. J. Holzhauer, W. A. Matheson, Jr.
Exhibiting: Automatic temperature controls for all fuels and for all types of heating.

PETROMETER CORP., 1 Star Sq., Long Island City 1, N. Y.—Booth 548
In attendance: Dan Bierman, Arthur Bierman, Norbert Milair, Joseph Jawett.
Exhibiting: Tank gages; industrial "Liquidepth" indicators, and cleanout valves.

PITTSBURGH CORNING CORP., 307 Fourth Ave., Pittsburgh 22, Pa.—Booth 547
In attendance: Robert F. Quinn, V. Sanders, J. W. Brennan, A. C. Kelterborn.
Exhibiting: "PC" glass blocks and "Foamglas" insulation.

PITZ FOUNDRY, INC.—see AMERICAN HYDROVAC

PLUMBING & HEATING BUSINESS, Grand Central Terminal Bldg., New York 17, N. Y.—Booth 53
Exhibiting: Publication.

POWERS REGULATOR CO., 2720 Greenview Ave., Chicago 14, Ill.—Booth 832
In attendance: J. W. Powers, F. A. Murray, K. M. Stevens, E. R. Bowman, C. A. Gustafson, A. J. Keating, H. W. Fea, E. W. Rietz, D. A. MacWatt, E. K. Wagner, H. L. Lundvall, A. H. Moraweck, E. J. Peterson, W. Roberts, T. W. Martin, W. H. Slater, M. Weninger, R. DeWallace, E. Mariner, G. E. Fickett, G. M. Cox, C. C. Flaherty, M. W. Jones, H. F. Hutchins, W. I. Collier, I. H. Dale.
Exhibiting: Pneumatic thermostats, valves, damper motors, switches, recording and indicating regulators, thermostatic water mixing equipment, heat exchanger controls, unit ventilator controls. "Flowrite" valves, "Metaflow" valves, "Accritem" regulator, "No-

Pak" radiator valves, "Powerstroke" damper motor, and remote bulb summer-winter thermostats will be featured.

PREFERRED UTILITIES MFG. CORP., 1860 Broadway, New York 23, N. Y.—Booth 947
In attendance: R. S. Bohn, G. W. Bohn, W. H. Bohn, J. S. Kaplan, B. K. Breed, E. L. Webster.
Exhibiting: Commercial and industrial oil burners and gas burners and accessories, and featuring new combination gas-oil conversion burner.

PRITCHARD & CO., J. F., 908 Grand Ave., Kansas City, Mo.—Booth 25

PUTT, ALLEN A., 120 Cedar St., New York 6, N. Y.—Booth 221

PYLE-NATIONAL CO., MULTI-VENT DIV., 1334 N. Kostner Ave., Chicago 51, Ill.—Booth 15
In attendance: D. I. Packard, G. K. Raider, W. M. Nesteruk, Robert Arnold, Ralph B. Dome, M. M. Connell.
Exhibiting: "Multi-Vent" ceiling panels for uniform low velocity air diffusion, featuring new modular 1 ft panels "in comparison with a conventional form of air injection."

QUIET HEET MFG. CORP., 135 N. J. R. R. Ave., Newark 5, N. J.—Booth 706
In attendance: S. L. Peters, Oscar Mann, H. M. Spitzer.
Exhibiting: Conversion oil burner, window type room air conditioner, sump pumps, and featuring conversion gas burner.

RCS TOOL SALES CORP., 25 N. Ottawa St., Joliet, Ill.—Booth 833
In attendance: F. S. Russell, T. M. Sweeney, Dale D. Davis, C. R. Longanecker, E. R. Meyers.
Exhibiting: "Super-Saw" portable, all purpose, roughing-in power saw. New fast method of roughing-in electrical, heating, plumbing, maintenance and repair work will be shown.

RADIANT UTILITIES CORP., 8817-18th Ave., Brooklyn 14, N. Y.—Booth 427
In attendance: Jacob G. Goldberg, Julius S. Goldberg, Arthur A. Marcus, Joseph Bloom.
Exhibiting: "Radiant" oil burners, featuring new models designed with the shell combustion head, which is produced in five models from 1/2 to 10 gal.

RADIATOR VALVE CO. OF AMERICA, 428 S. 52nd St., Philadelphia 43, Pa.—Booth 24
In attendance: Nathan Feldstern, J. Christian Myers, Jr., Robert Mott.
Exhibiting: Induced vacuum valves for radiators (steam and vapor), end line vents (induced vacuum type), compensator (attaches above boiler and produces a pumplike action in forcing heated vapor from boiler to radiators), automatic air eliminating valves for hot water radiators and systems.

RANDALL GRAPHITE BEARINGS, INC., 207 E. Market St., Lima, Ohio—Booth 34
In attendance: Alan Dale, K. W. Strunk, George Zapp, E. C. Smith.
Exhibiting: Self aligning, self lubricating, and deep well type pillow blocks, safety collars, bronze bushings, graphited bronze bushings. "Deep Well" oil reservoir in conjunction with self lubricating features in both graphited bushings, ball assemblies and complete pillow blocks will be featured.

READY-POWER CO., 11231 Freud Ave., Detroit 14, Mich.—Booth 731
In attendance: W. S. Jewell, Robert Marsh, William Wendt, W. T. Gilbert.
Exhibiting: Engine refrigeration units—15, 25 and 35 tons—for air conditioning. Latest 1951 models will be exhibited featuring "many new improvements."

REDMOND CO., INC., Owosso, Mich.—Booth 634
In attendance: J. W. Tweedy, G. Baumhardt, R. T. Abrell, G. Calkins, Harvey Wilgus, John Witmer, Mike Koenig, W. R. Fox, Paul Schwarz.
Exhibiting: Fractional horsepower electric motors and motor blower units.

REINHARD BROTHERS CO. INC., 11-17 S. 9th St., Minneapolis 2, Minn.—Booth 445
In attendance: Lawrence V. La Clare.
Exhibiting: Domestic and industrial gas conversion burners.

REMINGTON CORP., Willey St., Auburn, N. Y.—Booth 726
In attendance: E. A. Bonneville, W. H. Peters, E. M. Johnson.
Exhibiting: Complete line of room air conditioners, including window units and console units for 115 and 230 volt ac and dc single phase or three phase.

RESEARCH PRODUCTS CORP., 1015 E. Washington Ave., Madison 10, Wis.—Booth 202
In attendance: A. W. Brown, J. G. Schutz, C. B. Rowe.
Exhibiting: "R-P" air filters, both washable and replacement types, grease filters, "Coolpad".

RHEEM MFG. CO., 570 Lexington Ave., New York 22, N. Y.—Booth 521

RICHMOND RADIATOR CO., 19 E. 47th St., New York 17, N. Y.—Booths 625-631
In attendance: C. W. Farrar, J. Sargeant, N. Rowen, W. Davis, G. Day, E. B. Hauf, E. Reichert, G. Cheasley, E. Selig.
Exhibiting: Gas fired furnaces, gas fired boilers and oil fired furnaces. New oil fired steel winter air conditioner will be featured.

RIC-WIL CO., 1052 Union Commerce Bldg., Cleveland 14, Ohio—Booths 207-209
In attendance: C. W. Wheeler, W. S. McLeish, H. W. Roskilly, Oliver Johnson, W. L. Bartel, E. S. Pandy, S. Traina, J. Rowe, A. Cobb, W. F. Wood, K. Ryan, S. Bajackson.
Exhibiting: Insulated piping for underground and overhead distribution of steam, hot water, oil and process liquids; "Hel-Cor" units with new baked-on phenolic resin coating for maximum resistance to corrosion; prefabricated housings for expansion joints for protecting and insulating packless type expansion joints, eliminating manholes and periodic maintenance. With illustrations, cross sections and full-size samples of insulated piping, its application for heating, cooling or power piping—industrial, commercial or residential—will be emphasized.

RIDGE TOOL CO., 400 Clark St., Elyria, Ohio—Booths 333-335
In attendance: W. L. Parcell, R. D. Fye, George Joseph, Frank Zakary, C. O. Hollen.
Exhibiting: Pipe wrenches, pipe cutters, pipe vises, pipe reamers, pipe threaders, compound leverage wrenches, power drives, bolt dies and pipe machines. New pipe and bolt threading machine will be featured.

RITTLING CORP., 1202 Rand Bldg., Buffalo 11, N. Y.—Booth 747

ROBERTS-GORDON APPLIANCE CORP., 44 Central Ave., Buffalo 6, N. Y.—Booths 407-409
In attendance: W. S. Gordon, Jr., L. C. Smyth, R. I. Warnecke, W. E. Davis, R. T. Huyck.
Exhibiting: Conversion burners, gas-gas and gas-oil dual fuel burners, "Nordensson" industrial burners, winter air conditioning, unit heaters. Special attention will be called to the gas-gas dual-fuel burner. These conversion burners can be converted to use natural, manufactured or mixed gas with LP gas standby.

ROBERTSHAW-FULTON CONTROLS CO., FULTON SYLPHON DIV., Knoxville 4, Tenn.—Booths 429-431

ROME-TURNEY RADIATOR CO., Canal St., Rome, N. Y.—Booths 616-618
In attendance: William L. Lynch, John J. Boylan, Edwin J. Parry, E. L. A. Forster, Joseph M. Shannon, Francis J. Larkin, Thomas Murphy.
Exhibiting: "Rocop" convector radiators, blast air heating coils, blast air cooling coils, extended surface finned tubing, and featuring baseboard radiation.

ROSS HEATER & MFG. CORP., INC., West & Forest Aves., Buffalo 13, N. Y.—Space B

RUSSELL CO., F. C., 1100 Chester Ave., Cleveland 1, Ohio—Booth 848
In attendance: Drew N. Martin, E. T. Campbell.
Exhibiting: "Rusco" all metal combination self-storing screen and storm sash; all metal prime windows; all metal combination screen and storm doors.

SARCO CO., INC., 350 Fifth Ave., New York 1, N. Y.—Booth 38
In attendance: H. F. Collins, R. C. Cumming, M. J. Marion, F. C. Perkins.
Exhibiting: Steam traps (thermostatic, bucket, float and expansion types); "Sarcotherm" weather controls for hot water heating; radiator valves, traps and balancing fittings for steam and hot water systems; temperature regulators; water blenders; air eliminators for steam and water; boiler return traps; lift fittings; pipe line strainers. Weather compensating control for steam heating systems, float traps with new thermodynamic air bypass, and "Sarcostat" two position hydraulic motorized valve will be featured.

SERVEL, INC., 119 N. Morton Ave., Evansville 20, Ind.—Booth 602
In attendance: H. C. Pierce, C. A. Rickner, J. J. McCormick, W. S. McEwen.
Exhibiting: Gas-operated "All-Year" air conditioner (3 tons cooling and 96,000 Btu heating capacity); steam operated packaged type air conditioner (5 tons cooling and 87,300 Btu heating capacity); and cooling tower for use with 3 ton air conditioners. This will be the first public showing of the 20 ton Model DUT absorption refrigeration unit, which will operate with steam from any source and will deliver its refrigeration tonnage in the form of chilled water piped to external heat exchange surfaces for air cooling effect.

SHEFFLER-GROSS CO., 1000 Drexel Bldg., Philadelphia 6, Pa.—Booth 426
In attendance: M. Sheffler, Samuel Gross, Thomas J. Kenny, G. K. Fisher, J. H. Wilkers, Arthur T. Lawley, George C. Halwas, J. B. Butler, C. C. Bieber, Carl Hafer, W. J. Doyle, R. R. Paget, Harry Updegrave, J. Gallen.
Exhibiting: Space will be used as a reception booth to tie in with two of exhibitor's principals, the Liquidometer Corp. and the Fulton-Sylphon Div. of Robertshaw-Fulton Controls Co. Exhibit will "spotlight" new McAlear externally pilot operated pressure reducing valve.

SIEMON & CO., 1819 Holmes St., Kansas City 8, Mo.—Booth 109
In attendance: Richard H. Siemon, Charles D. Jones, John P. Johns, John Douglass.
Exhibiting: Industrial gas burners and conversion burners. New "Combi-Matic" gas-oil burner, operating with pressure type oil burner and needing no combustion chamber, will be featured.

SILENT-FLAME MFG. CO., INC., 807 Zerega Ave., Bronx 61, N. Y.—Booth 818
In attendance: John M. Sibarium, William Singer, Charles Fuchs, Jack Raskin, Murry Walshin, Paul Walshin, Martin Walshin.
Exhibiting: Oil burners, sump pumps, and 10,000 volt transformer.

SKUTTLE MFG. CO., 4099 Beaufait Ave., Detroit 7, Mich.—Booth 346

SMITH CORP., A. O., P. O. Box 584, Milwaukee 1, Wis.—Booths 741-745
In attendance: J. W. Long, Donald Williams, Walter Stake, R. J. Shepard, C. W. Johnson, J. F. Donnelly, H. N. Johnson.
Exhibiting: "Burkay" volume water heaters and home heating boilers and "Permaglas" domestic water heaters.

SMITH CO., INC., H. B., 57 Main St., Westfield, Mass.—Booth 117
In attendance: S. K. Smith, J. E. Reed, Leo Sudhaus, Trever Jackson, William Todd, Harry Walther, Guy Smith.
Exhibiting: "Mills" cast iron sectional, header type, water tube boiler; "No. 1100" boiler-burner unit; and featuring "No. 2000" boiler-burner unit.

SOUTHWEST MFG. CO., P. O. Box 28, Aurora, Mo.—Booth 439
In attendance: B. J. Hart, F. P. Munsinger, M. S. Nicholson, William J. Blackwell, Carl H. Dean.
Exhibiting: "Heatwave" floor furnaces.

SPARKLER MFG. CO., Mundelein, Ill.—Booth 820
In attendance: A. C. Kracklauer, F. W. Leuthesser.
Exhibiting: Fuel oil filters for oil burners and for space heaters and hot water heaters.

SPENCER HEATER—see LYCOMING-SPENCER DIV.

SPENCER THERMOSTAT DIV.—see METALS & CONTROLS CORP.

STANDARD STAMPING & PERFORATING CO., 3131-3165 W. 49th Pl., Chicago 32, Ill. —Booth 417
In attendance: Lloyd Stone, William Ramquist.
Exhibiting: Registers and grilles.

STEEL PRODUCTS ENGINEERING CO., COMBUSTIONEER DIV., 1205 W. Columbia St., Springfield, Ohio—Booth 125
Exhibiting: Oil burners, gas burners, oil furnaces, gas furnaces, all-fuel furnaces, stokers, humidifiers, and featuring conversion gas burners and low pressure oil burners.

STEWART MFG. CO., INC., Grove Ave., Cedar Grove, N. J.—Booth 302
In attendance: Fred J. Stewart, R. Douglas Anderson, J. M. Kelch.
Exhibiting: Grilles and registers.

STURTEVANT DIV.—see WESTINGHOUSE ELECTRIC CORP.

SUNDSTRAND ENGINEERING CO., 1325 Seventh St., Rockford, Ill.—Booth 644
Exhibiting: Domestic pressure-type burners.

SUNDSTRAND MACHINE TOOL CO., 2421 Eleventh St., Rockford, Ill.—Booths 423-425
In attendance: B. F. Olson, L. H. Schuette, C. W. Lang, B. L. Douglass, O. E. Mayfield, J. F. Griffey, R. E. Stevens, R. J. Murphy, C. L. Sadler, B. L. Soderberg.
Exhibiting: Fuel units for oil burners, featuring models with and without solenoid.

SURFACE COMBUSTION CORP., 2375 Dorr St., Toledo 1, Ohio—Booths 901-905
In attendance: F. H. Adams, C. B. Phillips, R. A. Bell, H. C. Gurney, W. J. Grover, C. C. Owen, R. E. Hollinshead.
Exhibiting: "Janitrol" domestic-commercial gas-fired space heating equipment, including winter air conditioner, gravity furnace, unit heaters, "Triple Service" boilers, cast iron boilers, floor furnace, conversion burners. The gas-fired conversion burners incorporate such exclusive features as the "Turbo-Flame" diffuser, "Electro-fyre" sparkplug type pilot igniter, "Glo-fyre" runner-flame type of pilot igniter, and "Unit-Thrift" combination electric gas valve and pressure regulator. Stress will be put on the "Janitrol" cooperative dealer merchandising program.

SYNCROMATIC CORP., 1141 Tenth St., Watertown, Wis.—Booth 51
In attendance: R. C. Jaye, H. M. Stillman, George Day, George House.
Exhibiting: Steel oil fired forced warm air furnaces (high boy and basement type); steel gas fired forced warm air furnaces (high boy and basement type); steel hand fired coal deluxe forced air furnace; high capacity oil fired furnace. Exhibit will feature new high capacity furnace for industrial heating with gas or oil.

TACO HEATERS INC., 137 South St., Providence 3, R. I.—Booth 614
In attendance: J. Balter, J. R. Murphy, E. T. Houlihan, H. Lucas, W. Klein, W. Sliney, R. Chaffee, R. Angevine, H. Lisowski.
Exhibiting: Circulators (pumps), water heaters, tempering valves, automatic hot water air valves, relief and reducing valves, venturi fittings, "Flocheks", "Flo-Vet", "Paneltrol" and "Taco-Matic" valve.

TAL BENDER, INC., 417 N. Water St., Milwaukee 2, Wis.—Booth 67
In attendance: E. T. Tal, W. R. Parker.
Exhibiting: Pipe and tube bending equipment. Bending formers made of special aluminum alloys will be featured.

TANN CORP.—see CONGRESS DRIVES DIV.

TANNER-HALL, INC., 252 N. 11th St., Philadelphia 7, Pa.—Booth 239
In attendance: Edward R. Tanner, Richard I. Tanner, James T. Hall, Jr., Raymond C. Tanner, Lawrence I. Tanner.
Exhibiting: United States Air Conditioning Corp. packaged air conditioning.

TEMCO, INC., 4104 Park Ave., Nashville 9, Tenn.—Booths 737-739
In attendance: L. E. Nordholt, Frank Drake, Howard Bourner, P. W. Cullom, George R. Darche, Boyd Tozer.
Exhibiting: Gas fired wall heaters, conversion burners, floor furnaces, vented heaters, forced air heaters. The conversion burners and wall heaters will be featured.

THATCHER FURNACE CO., Center St., Garwood, N. J.—Booth 201
In attendance: C. Sahler, R. Cook, M. Beard, D. Turner, B. Smith, J. Sheehan, J. Ahearn, J. Leeson, E. Short, D. Buckley, R. Eyers, J. Keefe, J. Price.
Exhibiting: Oil fired "Comfortmaster"; oil fired winter air conditioner; oil fired "Hi-Boy" winter air conditioner; oil fired counterflow "Hi-Boy" winter air conditioner; gas fired "Comfortmaster"; gas fired winter air conditioner; gas fired gravity warm air furnace; coal fired winter air conditioner; "Thermaster" coal fired gravity furnace; "Oilmaster" oil fired boiler; conversion oil burner. New oil fired counterflow winter air conditioner and gas fired gravity warm air furnace will be featured.

THRUSH & CO., H. A., Peru, Ind.—Booth 94
In attendance: George H. Fox, E. D. Noland, G. O. Johnson, L. D. Grose, W. J. Johnson, R. E. Clegg, T. E. Fahy.
Exhibiting: Complete line of hot water heating specialties, including circulators, flow control valves, low and high pressure relief valves, high pressure reducing valves, heaters and electrical controls, as well as complete line of cast iron or bronze one pipe supply tees, adjustable and nonadjustable. Vertical type flow control valve with both iron and bronze outlet connections, with and without air vent tube, and horizontal circulator with exclusive motor mounting features will be given special attention.

TILO ROOFING CO., INC.—see GLASFLOSS DIV.

TITUS MFG. CORP., 113 E. 8th St., Waterloo, Ia.—Booth 234
In attendance: Donald L. Titus, Bob Wirth, Mrs. J. D. Davis, I. M. Golan, Jack L. Canady.
Exhibiting: Grilles, registers, volume controller, and frames. A combination grille giving two way deflection plus a volume controller on the back side, enabling the job to be balanced without removing the grille from the wall, will be featured.

TRANE CO., LaCrosse, Wis.—Booths 250-350-450-650-750
In attendance: D. C. Minard, W. T. Hancock, E. A. Cline, R. E. Lee, R. G. Lubinsky, M. L. Hoglund, Lee Gatewood, A. C. Menke, L. R. Fuller, H. J. Waggle, G. E. Hicke, C. R. Conner, R. E. Haskins, E. T. Neubauer, R. L. Bernhard, J. L. Bartlett, R. C. Rooks, F. Sontag, R. A. Matheis, K. E. Sontag, C. H. Lindner, J. J. Kittrege, R. S. Knowles, B. M. Menden, G. C. Breitenbach, P. A. MacArdle, R. K. Leilich, J. J. Whalen, J. J. Wessmiller, P. C. Hutchins, John Spencer, A. E. Halvordson, W. F. Ridout, D. Chytalo, J. Obrig, D. C. O'Keefe, R. D. Gotwals, H. L. Whitmoyer, W. Cowart, E. C. Liebrecht, J. P. Sheehan, J. W. Sutch, W. L. Colross, J. W. Lozier, J. J. Callahan, R. W. Christie, J. H. Baker, T. C. Moore, G. M. Robertson, E. S. White, Cecil Rockey, G. H. Van Steenbergh, D. H. Neviaser, F. W. Taylor, R. L. Hoddinott.
Exhibiting: New "Centravac" hermetic centrifugal compressor and water chiller for 45 to 150 ton refrigeration range; new line of reciprocating compressors for 50 to 150 ton refrigeration range; completely redesigned and re-engineered series of self-contained air conditioning units; compact, streamlined, multiple-zone "Climate Changer" air conditioning unit; new gas fired duct heater; centrifugal fans; new louver cone and louver fin diffusers for unit heaters; new, heavy-duty line of projection type vertical discharge unit heaters for industrial heating uses and commercial buildings; new gas fired unit heaters employing louver fin diffuser; classroom shelving that matches unit ventilators for schools; new line of evaporative condensers; new line of water circulators; new lines of bucket traps and thermostatic traps. The exhibit will be a 173 ft long panorama of products, many of them in operation, lining most of the south wall of the exhibit hall.

TRIAD PRODUCTS CORP., 5121 N. Clark St., Chicago 40, Ill.—Booth 647
In attendance: Russell L. Geaslen, C. E. Tomlin, Charlie Pratt.
Exhibiting: Boilers, baseboard radiation, radiant panels, conversion gas burners, and featuring horizontal gas and oil fired packaged heating boilers.

TRION, INC., 1000 Island Ave., McKees Rocks, Pa.—Booth 98
In attendance: P. W. Aitkenhead, J. W. Frazier, G. F. Landgraf, R. W. McGuire, E. W. Meyers, W. R. Murdock.
Exhibiting: Electric air filters, and equipment for electrostatic cleaning and purifying of air or other gases. Four standard packaged units for residential and small commercial installations; custombuilt "packaged" units to 10,000 cfm; and built-up units to handle any capacity will be featured.

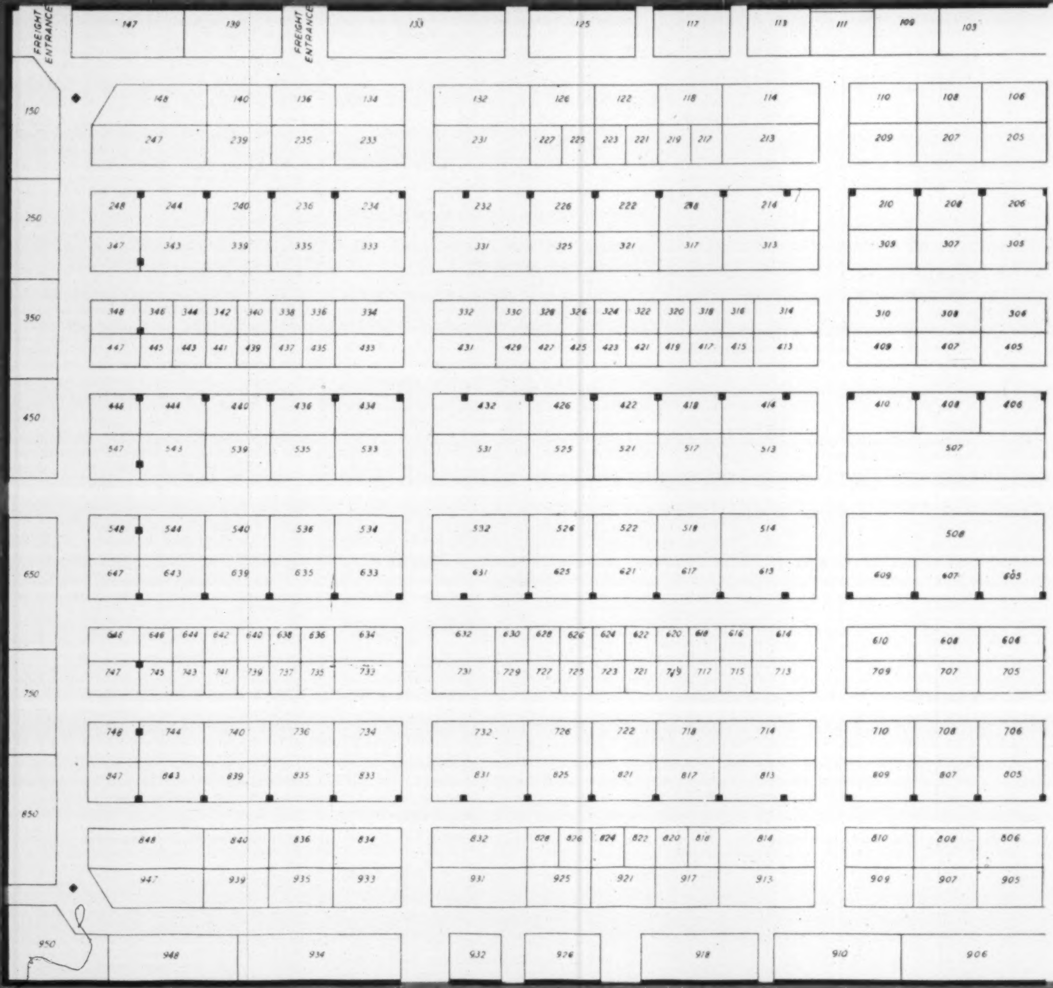
TURB-O-TUBE FURNACE INC., 106 Kingsley St., Buffalo, N. Y.—Booth 935
In attendance: J. B. W. Carmichael, Alex. H. Dann.
Exhibiting: Gas and oil fired furnaces.

TUTTLE & BAILEY, INC., Corbin Ave., New Britain, Conn.—Booth 613
In attendance: Stanley Hart, J. H. Smart, L. Zavorski, L. B. Wilson, R. D. Tutt, P. F. Conway, A. E. Wood, C. E. Daily, J. F. Scouler, J. W. Taggart, H. H. Mather.
Exhibiting: Ceiling diffusers, grilles, registers and air control devices for air conditioning, heating and ventilating; standardized copper convectors for steam and hot water installations.

XXTH CENTURY HEATING & VENTILATING CO., 96 Ira Ave., Akron 1, Ohio—Booth 217
In attendance: J. Garver Kerch, Royal K. Long, Edward F. McGann, C. E. Tomlin.
Exhibiting: Gas and oil fired warm air furnaces.

TYPHOON AIR CONDITIONING CO., INC., 794 Union St., Brooklyn 15, N. Y.—Booth 1
In attendance: James F. Dailey, Edward L. Garfield, Don V. Petrone, Don J. Dailey, Scott J. Hoehn, A. E. Weber, Edward Beck, Seymour Jarcho, Larry D. Spence.
Exhibiting: 3 ton packaged air conditioning unit, console model; 5, 8, 10 and 20 ton packaged air conditioning units; 10 and 20 ton evaporative condensers. Considerable emphasis will be placed on exhibitor's recent development of 10, 15 and 20 ton packaged units for free-standing applications, which are especially adaptable to supermarkets and large theaters.

U. S. MACHINE CORP., 320 North C St., Lebanon, Ind.—Booth 10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Booth Layout for Exposition at Commercial Museum, Philadelphia

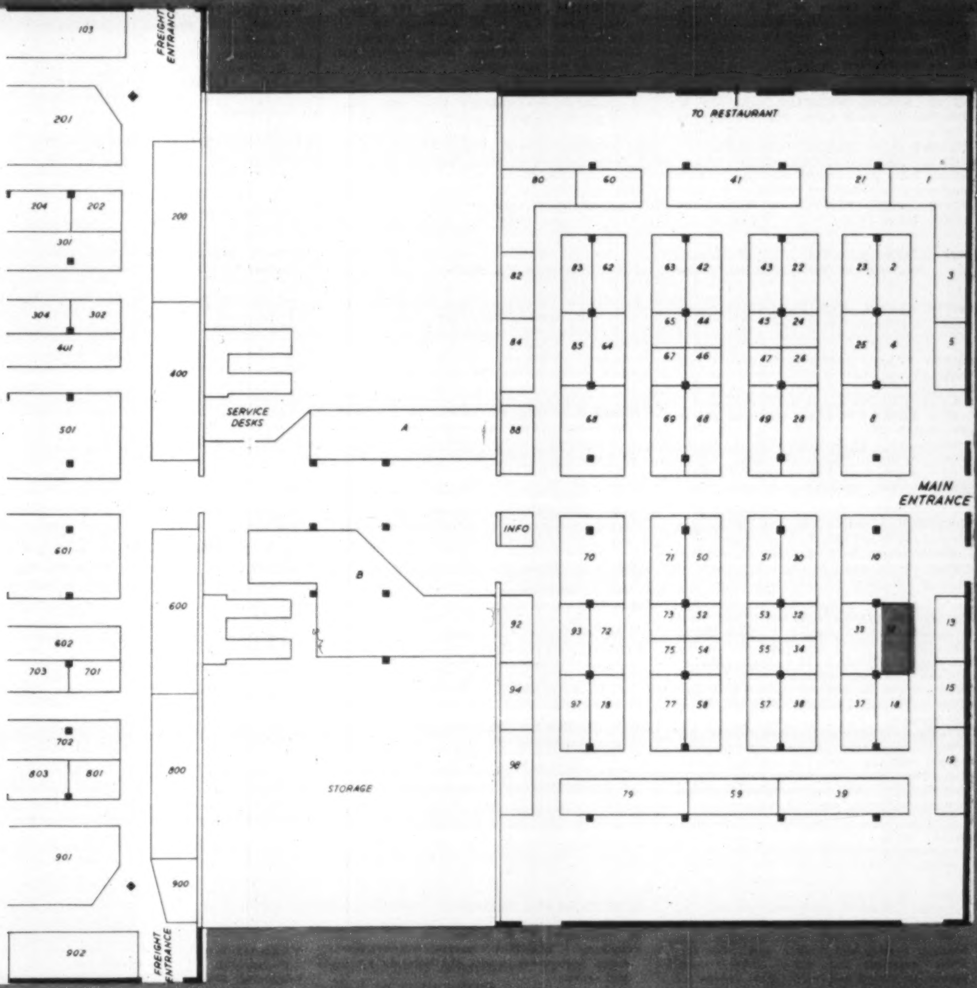
In attendance: Herman E. Winkler, Claude A. Potts, Walter E. Blake, Philip C. Kosch.

Exhibiting: "Winkler" low and high pressure oil burners; rotary cup heavy oil burner; oil fired furnaces; wall furnaces for oil and gas; and featuring new boiler-burner unit.

UNITED STATES AIR CONDITIONING CORP., Como Ave. S. E. at 33rd St., Minneapolis 14, Minn.—Booths 118, 239 & 824

In attendance: A. A. Feinberg, L. P. Hanson, D. E. Feinberg, William Moiselle, M. A. Stuart, H. J. Schorle, A. J. Rocklitz, L. R. Gordon, H. D. Galson, B. E. Leventhal, D. Milligan.

Exhibiting: *Booth 118* — General air conditioning equipment display, including two "usAIRco Modu-aire" units, individual room heating and cooling units for multi-room buildings which permit individual room weather control; blower type unit heater for all types of commercial and industrial heating requirements, displayed with complete accessory group including face and bypass dampers, filter section, mixing chamber and air distribution cowls; housed ventilating set for use indoors or outside with universal discharge to make it adaptable to every application, and featuring new "Vari-Flo" control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For further information, you are invited to inquire at the Keeney Publishing Co.—publisher of Heating, Piping & Air Conditioning and American Artisan—exhibit in Booth No. 12

of air volume plus a number of other design features.

Booth 239—Refrigeration products display, including two store conditioners, new 2 ton unit as well as 5 ton unit, introducing expanded line of store conditioners available in 2, 3, 5, 7-½ and 10 ton models; "Refrigerated Kooler-aire", complete, ready-to-run "central plant" air conditioning unit available in capacities from 3 to 40 tons — a balanced assembly of the components of an air conditioning system ready for installation and operation and featuring built-in evaporative condenser, window model room air conditioner for homes and offices available in ½ and ¾ ton capacities.

Booth 824—Gas fired unit heater display, including propeller fan type with steel heat exchangers, blower type with steel heat exchangers and duct heater with cast iron heat exchangers.

UNITED STATES RADIATOR CORP., 300 Buhl Bldg., Detroit 26, Mich.—Booth 110
In attendance: A. F. Westerfield, J. R. Knox, M. L. Judd and managers and personnel of the New York, Philadelphia, Harrison, Baltimore and Washington branches.

Exhibiting: New family of "U.S." boilers, horizontal furnace, radiant baseboard. Gas boiler, all fuels boiler, and horizontal warm air furnace will be featured.
Also see Pacific Steel Boiler Div.

UNITED STATES REGISTER CO., 344 E. Burnham St., Battle Creek, Mich.—Booth 733
In attendance: Charles J. Pearson, Harry G. Hollman, A. A. Stagg, E. P. Kromdyk.
Exhibiting: Gravity and air conditioning registers, faces, etc.; vents and grilles; back pressure and exhaust fan dampers. Air conditioning with wall baseboard registers and round ceiling outlets will be featured.

UNITED STATES STEEL CO., 436 Seventh Ave., Pittsburgh 30, Pa.—Booths 740 & 839

UNITED STATES STEEL EXPORT CO., Chicago, Ill.—Booths 740 & 839

UNITED STATES STEEL SUPPLY CO., Chicago, Ill.—Booths 740 & 839

V. & E. PRODUCTS INC., Schuylkill Haven, Pa.—Booth 136
In attendance: J. H. Eubanks, Lionel L. Jacobs, Bruce L. Jacobs, Walter Moriarty.
Exhibiting: Steel water tube boilers, steel "Wallflame" boilers, travelling grate stoker units.

VIBRATION ELIMINATOR CO., 10-28 47th Ave., Long Island City 1, N. Y.—Booth 65
In attendance: S. Kahn, G. Hommel, L. Semmens.
Exhibiting: Isolation of machinery vibration.

VIKING AIR CONDITIONING CORP., 5601 Walworth Ave., Cleveland 2, Ohio—Booth 410
In attendance: Marion I. Levy, Frank Gibbons, Richard F. Gang, Laurence Bloom, Lyall M. Bush, Lowell A. McCord, Robert R. Briggs, John A. Green, Thomas J. McIntyre, M. F. Mackenzie.
Exhibiting: Furnaces — "complete-line-in-one-model"; new type of direct drive blower; blower package; night air cooling window fan. New "2300" humidifier which "fits all furnaces, does away with inventory problems, speeds installation" will be featured.

VIKING MFG. CORP., 1747 Chester Ave., Cleveland 14, Ohio—Booth 918
In attendance: H. S. Frasher, M. C. Cameron, T. L. Hildreth, A. C. Gustafson, L. J. Norton, W. P. Loer.
Exhibiting: "Flatpak" ductwork, gas and oil furnaces, gas floor furnaces, gas water heater, room cooler, packaged air conditioner, combination heating and cooling unit. Gas furnaces, basement and utility, shipped completely assembled and wired; new fittings for ductwork line; and new combination heating and cooling unit will be featured.

VULCAN RADIATOR CO., 26 Francis Ave., Hartford 6, Conn.—Booth 701
In attendance: John H. Ehn, Thomas L. Arnold, Richard B. Sweet, Joseph D. Pierce, John B. Rita, T. F. O'Connor, P. A. Cavanagh, J. P. Gilbon, D. B. O'Neill.
Exhibiting: Extended fin surface radiators with metal covers; "Radi Vector" baseboard radiation. New baseboard cover and new "Linovector" covers for schools, institutions, etc., will be featured.

WAGNER STOKER BOILER UNIT, Box 360, Pottsville, Pa.—Booths 147, 150

WALLACE CO., WILLIAM, Belmont, Calif.—Booth 221

WALTON LABORATORIES, INC., 1186 Grove St., Irvington, N. J.—Booth 714
In attendance: William Feldermann, John B. Feldermann, J. Robert Lewis, Ben Dickinson, Charles Bourgeois.
Exhibiting: Industrial, commercial, residential and office humidifiers; humidistat control and indicating equipment. New industrial humidifier, evaporating at the rate of 3 gph, will be featured.

WATERFILM BOILERS, INC., 154 Ogden Ave., Jersey City 7, N. J.—Booth 50
In attendance: A. R. Hanson, E. Wodecka.
Exhibiting: Residential steel heating boilers, and featuring packaged unit.

WATERMAN-WATERBURY CO., 1121 Jackson St., N. E., Minneapolis 13, Minn.—Booth 114
In attendance: H. G. Cross, Dave Sedgwick, Stuart Smith, Fritz Legler, Bill Morrisey, Roy Lonson, Otto Griefnow.
Exhibiting: Oil and gas fired seamless furnaces and winter air conditioners, oil and gas conversion burners. Downflow units for perimeter heating applications will be featured.

WATTS REGULATOR CO., Lawrence, Mass. —Booth 72
In attendance: Cyrus S. Gates, Ben G. Robertson, Ray Bitzer, Vernon Bitzer, Charles Lowrey, Carl Forvey.
Exhibiting: Complete line of plumbing and heating specialties, featuring dual controls and ASME accepted pressure relief valve.

WEBSTER & CO., WARREN, 17th & Federal Sts., Camden 5, N. J.—Booth 508
In attendance: Harold F. Marshall.
Exhibiting: Latest improved perimeter type baseboard heating; "Walvector" extended surface fin type radiation; latest improved "A System" radiation with built-in trap and valve; new convector radiators. Special feature will be large panel showing isometric drawings of typical modern heating systems.

WEBSTER ELECTRIC CO., 1900 Clark St., Racine, Wis.—Booth 834
In attendance: S. A. Loeb, A. E. Kleckner, P. G. Crewe, B. T. Wiechers, Harold Hastings, William Touhey, Dave Munroe, Louis Ehrich.
Exhibiting: "Thermodrive", electric fuel units, and electric ignition transformers, and featuring instantaneous cutoff for eliminating odors, smoke, soot, afterglow, flutter.

WEIL-McLAIN CO., Mfg. Div., Michigan City, Ind.—Booths 522-526
In attendance: T. D. Casserly, Walter C. Kern, Marvin Mitchell, Alex Schafer, Dan Schafer, Robert Stockwell, Phil Stockwell, W. G. Finnell.
Exhibiting: "Snug" baseboard panels (a new cast iron baseboard panel with radiant front); "Solray" radiators; "Raydiant" recessed radiation; oil heating unit; gas boiler; all fuel boiler; round boiler.

WESTINGHOUSE ELECTRIC CORP., P. O. Box 868, Pittsburgh 30, Pa.—Booth 41
In attendance: N. R. Miller.
Exhibiting: "Life Line" motors, starters, fractional horsepower motors and featuring a control center.

WESTINGHOUSE ELECTRIC CORP., STURTEVANT DIV., Hyde Park, Boston 36, Mass.—Booth 507
In attendance: J. G. Thompson, P. Cohen, T. E. Smith, W. B. Cott, H. M. Fisher, W. C. Goodwin, A. Martin, E. M. Powell, J. R. Welch, W. Brewer, E. C. Lambert, J. E. Justice.
Exhibiting: Air handling unit; hermetically sealed air conditioning compressors ranging from 2 to 100 hp; "Precipitron" electronic air cleaner; "Silentvane" fan; "Unitaire" conditioner. Encased "Precipitron", new 8 ton "Unitaire" conditioner, and central plant type air handling unit for heating, ventilating and air conditioning will be featured.

WHITE-RODGERS ELECTRIC CO., 1209 Cass Ave., St. Louis 6, Mo.—Booth 313
In attendance: Joseph Newman, J. A. Rodgers, Jack Searls, Ed Robinson, D. O. Eggert, Arnold Petersen, E. E. Harwood, F. Tanler, H. F. Killinger, Joseph Bierwirth, Jack Weigert.
Exhibiting: Complete line of automatic controls for heating, refrigeration and air conditioning, featuring "Hydraulic-Action" principle of temperature control. An operating demonstration board will illustrate typical forced warm air and circulated hot water heating systems.

WHITTINGTON PUMP & ENGINEERING CORP., 1126 Prospect St., Indianapolis 3, Ind.—Booth 28
In attendance: Dick W. Whittington, Charles W. Coward, Carl B. Eastman.
Exhibiting: Duplex vacuum heating pump, combination vacuum-pressure clinical unit, duplex condensation pump, and high pressure boiler feed unit. "Type HC" condensation pump and combination vacuum-pressure clinical unit will be featured.

WING MFG. CO., L. J., Vreeland Mills Rd., Linden, N. J.—Booth 111
In attendance: H. S. Wheller, C. H. Smith, T. R. Peyrek, George G. Nash, Ralph Hosey, Joseph Pellecchia, Edward Hubert, F. A. Anstice, J. M. Hancock, Walter Schnabel, R. J. Purcell, R. P. Stebbins, Irvin H. Geiger, G. M. Comstock, R. J. McCrory.
Exhibiting: Axial flow ventilating fans; revolving discharge unit heaters, turbine and electric driven; process heater sections; transformer coolers; elbow and straight line duct fans; draft inducers; forced draft blowers; auxiliary turbines. Dual drive forced draft blowers, axial flow draft inducer, and variable temperature process heater sections will be featured.

WORTHINGTON PUMP & MACHINERY CORP., Harrison, N. J.—Booth 103
In attendance: W. H. Feldman, C. E. Wilson, T. J. Kehane, M. M. Lawler, W. F. Bishop, F. J. Watt, O. B. Wert, E. R. Michel, H. E. Wood, E. C. Hamilton, P. H. Shaw, D. H. McCuaig, J. R. O'Neill, W. J. Millett, S. R. Hirsch, R. E. Holmes, C. K. Hood, W. J. Daly, R. H. Croll, H. K. Beck, R. M. Cleveland, F. J. Blacker, W. S. Farnum, T. Hinnant, W. L. Souther, H. Howell, R. O. Gundlach, C. Morrison, J. W. Wait, F. L. Andreoli, G. E. Tuckerman, H. F. Burpee, J. C. Conrad.
Exhibiting: Cutaway model of "Freon" reciprocating compressor; centrifugal refrigerating compressor; "Freon" reciprocating compressors ranging in capacity from 3 to 125 hp; room air conditioners; packaged air conditioner; evaporative condenser; central station air conditioner; 5 hp hermetic compressor unit; 3 x 3 ammonia refrigeration unit; "Freon" reciprocating condensing unit. The RVY series of room air conditioners will be exhibited for the first time; these units are suitable for multi-room installations such as hotels, apartments, hospitals and office buildings, and cool or heat the conditioned space using hot or chilled water pumped from a central source. The units are also available for use with direct expansion air conditioning systems.

YARNALL-WARING CO., Mermaid Lane, Philadelphia 18, Pa.—Booth 705
Exhibiting: Boiler blowoff valves, water columns and gages; steam line expansion joints; steam traps and strainers. Included in the display will be a working model of the standard "Yarway" impulse steam trap and samples of the new high capacity impulse steam trap.

YATES-AMERICAN MACHINE CO.—see GENERAL REFRIGERATION DIV.

YORK CORP., York, Pa.—Booth 800

YOUNG RADIATOR CO., Racine, Wis.—Booth 925
In attendance: F. M. Young, W. G. Schlichting, H. F. Brinen, P. J. Menden, F. C. Perkins.
Exhibiting: Air conditioning units; unit heaters; convectors; heating and cooling coils. New "YAC" air conditioning unit and low level convectors will be featured.

"Z" CRETE DIV., ZONOLITE CO., 3100 K St. N. W., Washington 7, D. C.—Booth 443

ZONOLITE CO., "Z" CRETE DIV., 3100 K St., N. W., Washington 7, D. C.—Booth 443

Heating, Piping & Air Conditioning

THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

JOURNAL SECTION

Principles of Effective Heat for Steam-Heated Structures

By C. O. Mackey[*], N. R. Gay[**], Ithaca, N. Y., R. D. Tutt[†], New Britain, Conn., E. G. Powell[††], Chicago, Ill., and E. L. Broderick[°], Mt. Vernon, N. Y.

SUMMARY — This paper contains a discussion of the term *effective heat* and means of giving it a definition. The object of tests was to determine the condensate necessary to heat a given structure to a given condition, with heating units having different air ejection heights and air outlet locations, and to determine a new standard against which to compare performance of convectors. Results of tests of a large number of heating units are given. The authors present a proposed table for effective heat allowance to be applied to convectors.

For each unit tested there was found to be one point of temperature measurement in the room corresponding to the least condensation from the heater while maintaining the desired temperature at this point. This point was found to rise with height of heater or heater air outlet and varied somewhat in position depending on the construction of the heater.

From test results it was concluded that, for the same outdoor temperature and infiltration and same structure, the room heat loss (*based on average temperature at all levels in center of room*) may vary with different heaters while maintaining the same average temperature.

EFFECTIVE heat is a term which has been used in the literature of heating, as the references indicate, for at least 25 years. The accepted meaning of this term will be explained before a precise definition is offered. Assume that it is desired to maintain a certain air temperature, 68 F, in the center of a room at a level of 24 in. above the floor, when the room is exposed to fixed conditions outside all surfaces. Each of several heating devices, whether radiator, convector, or baseboard, may maintain this air temperature *at the fixed point* under equilibrium conditions. In each case, however, it is possible that the rate of heat emission of the heating device may be different. With equilibrium conditions and no storage of energy, the rate of heat loss from the room must always be the same as the rate of heat emission within the room. There are at least two influences which may cause the rate of heat loss from the same room to be different even though the air temperature at a given point in the room is the same and the conditions affecting heat transfer on the outside of the room are not changed.

One of these influences arises from the fact that the air temperature within a room is not the same at every point. It is well known that the air temperature near the ceiling of a heated room is greater than the air temperature near the floor; the magnitude of the temperature gradient being dependent, in part, upon the type of heating device used. A device that produces a large ceiling to floor air temperature gradient may cause a larger heat loss from the room than a device producing a small gradient, even though each unit maintains the same air temperature at some *low* level in the room. This effect may be found even in a room with a perfectly insulated ceiling and floor, because the average air temperature causing heat transfer through exposed vertical surfaces may be greater. Of course, if the object of heating were to maintain some arbitrary, fixed air temperature at a *high* point in the room, the device creating the greater ceiling to floor gradient might operate with smaller heat loss.

The second influence is the local and direct effect that a heating device may have upon heat loss through

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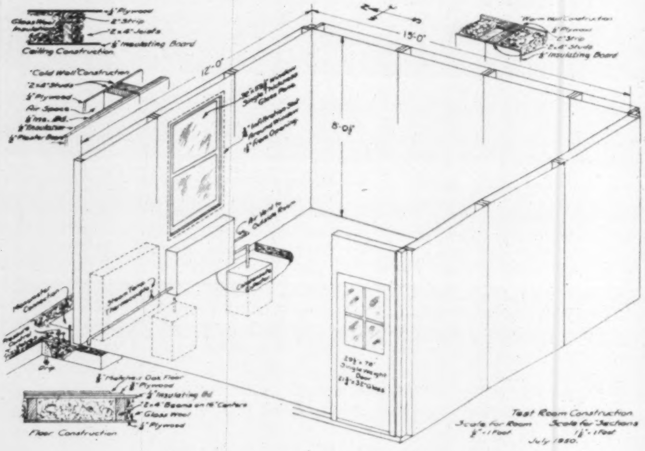
½" Plywood
2" Strip
Glass Wool Insulation
"2 x 4" Joists
½" Insulating Board
Ceiling Construction
"Cold Wall" Construction
"2 x 4" Studs
½" Plywood
Air Space
½" Ins. Bd.
½" Insulation
½" Plaster Board
12'-0"
15'-0"
8'-0⅛"
Warm Wall Construction
½" Plywood
2" Strip
2 x 4" Studs
½" Insulating Board
Air Vent to Outside Room
Manometer Connection
Steam Temp. Thermocouple
Pressure Control
Drip
Matched Oak Floor
½" Plywood
½" Insulating Bd.
"2 x 4" Beams on 16" Centers
Glass Wool
½" Plywood
Floor Construction
29¼" x 78" Single Weight Door
21½" x 32" Glass
Test Room Construction
Scale for Room ½" = 1 Foot
Scale for Sections 1½" = 1 Foot
July 1950.

Fig. 1—Test room construction

the structure. It is entirely possible to test two heating devices in the same room and discover that the rates of heat emission are different even though the *average* temperature of the air *at all levels in the center of the room* is the same. It is also possible to obtain the more puzzling combination of lower rate of heat loss from the room and greater average temperature of the air at all levels in the center of the room. These results are explained on the basis of a different local effect of the heating unit on the rate of conduction of heat through the wall near the unit.

An experimental method of measuring effective heat must be based upon the following procedure:

1. Select some heating device as the standard with which other heating devices are to be compared; for example, the standard device might be cast-iron radiators of the same design and height with different numbers of sections.
2. Choose the location of the index point and the property that is to be measured at this point as an indication of comfort; for example, this index point might be arbitrarily taken at the 24-in. level in the center of the room, and the air temperature might be selected as the property to be measured.
3. With a fixed temperature in the cold space, install the standard heating units and measure rates of heat emission and corresponding air temperatures at the index point; from these results, a graph may be plotted with temperature difference (air temperature at index point minus cold space temperature) *vs.* rate of heat emission; this procedure is better than trying to hold the air temperature at the index point constant in all tests by wrapping or blocking portions of the heating unit, as the latter alters the heating unit.
4. Install the non-standard heating units in the same test room and, for the same cold space temperature used in the standard unit tests, measure the rates of heat emission and the corresponding air temperatures at the index point.

Heating effect may now be calculated in the following way: assume that the non-standard unit shows a rate of heat emission of q Btu per hour with a temperature difference of Δt between air at the index point and cold space air. From the graph, plotted as a result of the tests of the standard units, read the rate of heat emission, q_s, of the standard unit required to maintain the same temperature differential. Then, percent effective heat is

$$EH = 100\ (q_s/q - 1) \ldots\ldots\ldots (1)$$

In short, effective heat shows how much greater the rate of heat emission of the standard heating unit must be than that of the non-standard unit in order to maintain the same air temperature at the index point in the test room with the same external conditions.

Such a definition gives effective heat as precise a meaning as may be assigned to many such engineering factors determined by tests. It must be stated, at once, that the same non-standard heating unit, when located in different positions in the same test room may give different values for effective heat. It must also be clear that standard and non-standard heating units, when tested in test room A, may give different values of effective heat than when both are tested in test room B. This is no new problem to be viewed with great alarm, however, because similar effects may be observed in capacity tests.

In the Commercial Standard CS 140-47 of the United States Department of Commerce for Testing and Rating Convectors, there appears a table for additions to observed ratings of convectors with front outlets. Amended form of Table 3 follows:

Maximum Additions to Capacity for Convectors with Front Outlets

Outlet height, measured from floor to top of outlet, in.	Add to capacity percentages not exceeding those listed below to arrive at rating, percent
36 or more	0
34	1
32	2
30	3
29	4
28	5
27	6
26	7
25	8
24	9
23	10
22	11
21	12
20	13
19	14
18 or less	15

Table 1—Calculated Values of the Overall Coefficients of Heat Transfer of the Cornell Cold Room.

	Area of Room-Side Surface, sq ft A	Overall Coefficient of Heat Transfer, Btu/(hr) (sq ft) (F deg) U	Rate of Heat Transfer Btu/ (hr) (F deg) UA
Net north wall	83.3	0.2	16.7
North window	13.2	1.1	14.5
Net west wall	104.6	0.2	20.9
West door	16.0	1.1	17.6
South wall	96.5	0.045	4.3
East wall	120.6	0.045	5.4
Floor	180	0.067	12.0
Ceiling	180	0.045	8.1
Totals	794.2		99.5

For ratings of convectors with top outlets, no additions to observed capacity are allowed.

For ratings of convectors with inclined outlets, the maximum additions to capacity are found by multiplying the tabular values for front outlets by the ratio of the angle of outlet with the horizontal to 90 deg. For example, a 30 deg slant top convector with the top of the outlet 24 in. above the floor would have a maximum addition to observed capacity of (30/90) (9) or 3 percent.

Purpose of Tests

The purpose of the test program suggested by the Engineering Committee of the *CMA*, consisting of E. G. Powell, R. D. Tutt, and E. L. Broderick (consultant), was to determine the condensate necessary to heat a structure to a given condition when using devices of different outlet air ejection heights and locations and to determine a new standard against which to compare the performance of the convectors.

Test Procedure

All radiators, convectors, and baseboards were tested in the cold room of the Sibley School of Mechanical Engineering at Cornell University with a procedure that complied with Commercial Standard CS 140-47. The construction and arrangement of this cold room are shown in Fig. 1. The cold room is enclosed in a refrigerated shell space that is 26 ft × 29 ft with a ceiling height of 11 ft 11 in. Cold air is supplied through a horizontal duct that runs above the inner cold or test room; air is recirculated to the coil room at the floor level of the shell space. As indicated in Fig. 1, the west and north walls of the test room simulate exposed walls, while the south and east walls, floor, and ceiling are more heavily insulated. Calculated values of the overall coefficients of heat transfer for the structure appear in Table 1.

Table 2—Explanation of Tests

Test Number	Unit Tested	Description and Location of Unit	Height of Top of Discharge Grille, in.	Infiltration Around Window, cfm
1	7-section C. I. Radiator	32 in. high; between window and west wall	—	12
2	8-section C. I. Radiator	32 in. high; between window and west wall	—	12
3	9-section C. I. Radiator	32 in. high; between window and west wall	—	12
4	10-section C. I. Radiator	32 in. high; between window and west wall	—	12
5	12-section C. I. Radiator	32 in. high; between window and west wall	—	12
11	Front outlet convector	32 in. high; 30 in. long, 6 in. deep; between window and west wall; element 6 in. x 29⅝ in. and 5½ in. above floor at low end	30½	12
12	Front outlet convector	24 in. high; 44 in. long, 4 in. deep; under window; element 4 in. x 43⅝ in. and 5½ in. above floor at low end	22½	12
13	Front outlet convector	24 in. high, 32 in. long, 6 in. deep; under window; element 6 in. x 31⅝ in. and 5½ in. above floor at low end	22½	12
14	Front outlet convector	24 in. high, 26 in. long, 8 in. deep; under window; element 8 in. x 31⅝ in. and 5½ in. above floor at low end	22½	12
15	Front outlet convector	20 in. high, 36 in. long, 6 in. deep; under window; element 6 in. x 35⅝ in. and 5½ in. above floor at low end	18½	12
16	Front outlet convector	12 in. (nominal) high, 54 in. long, 6 in. deep; under window; actual height of 13½ in., entire unit raised so that low end of element is 5½ in. above floor; inlet taped to give same air opening as in test 17; element 6 in. x 53⅝ in.	13	12
17	Front outlet convector	12 in. high; 54 in. long, 6 in. deep; under window; element 6 in. x 53⅝ in. and 4 in. above floor at low end	11½	12
18	Type RC baseboard	10 in. high and 9 ft long; under window on north wall	9½	12
19	Finned tube baseboard with enclosure	8½ in. high and 10 ft long; under window on north wall	8	12
21	30° slant top convector	32 in. high, 27 in. long, 6 in. deep; between window and west wall; element 6 in. x 26⅝ in. and 5½ in. above floor at low end	31½	12
22	30° slant top convector	24 in. high, 32 in. long, 6 in. deep; under window; element 6 in. x 31⅝ in. and 5½ in. above floor at low end	23½	12
23	30° slant top convector	20 in. high, 32 in. long, 6 in. deep; under window; element 6 in. x 31⅝ in. and 5½ in. above floor at low end	19½	12
24	30° slant top convector	12 in. (nominal) high, 54 in. long, 6 in. deep; under window; element 6 in. x 53⅝ in.; actual height of 13½ in. with same air inlet opening as in test 16; low end of element 5½ in. above floor	13	12
31	Top outlet convector	32 in. high, 27 in. long, 6 in. deep; between window and west wall; element 6 in. x 26⅝ in. and 5½ in. above floor at low end	32	12
32	Top outlet convector	24 in. high, 32 in. long, 6 in. deep; under window; element 6 in. x 31⅝ in. and 5½ in. above floor at low end	24	12
33	Top outlet convector	20 in. high, 30 in. long, 6 in. deep; under window; element 6 in. x 29⅝ in. and 5½ in. above floor at low end	20	12
34	Top outlet convector	Same unit as in test 33	20	0
35	Top outlet convector	12 in. (nominal) high, 54 in. long, 6 in. deep; under window; element 6 in. x 53⅝ in.; actual height of 13½ in. with same air inlet opening as in test 16; low end of element 5½ in. above floor	13½	12
36	Top outlet convector	Same unit as in test 35	13½	0
41	Non-Standard C. I. Radiator	19 in. high; between window and west wall	—	12
42	Non-Standard C. I. Radiator	19 in. high; under window; same unit as in test 41	—	12

During most of the tests reported, air was supplied through a continuous slot around the periphery of the north window at a controlled rate of 12 cfm by a small blower taking cold air from the shell space (see Fig. 2). In this way, infiltration of air through window cracks, amounting to one-half air change per hour was simulated. This is equivalent to an additional heat loss of 13 Btu per (hr) (F deg), making the total for the room 112.5 Btu per (hr) (F deg). In all tests, the air temperature in the cold shell space was held at 14 F ± ½ F. Air motion in the test room was a result of natural circulation, and the relative humidity in the test room was well under 75 percent in all tests.

Steam was supplied to each unit tested at a controlled pressure of 31.75 in. Hg absolute, which is the

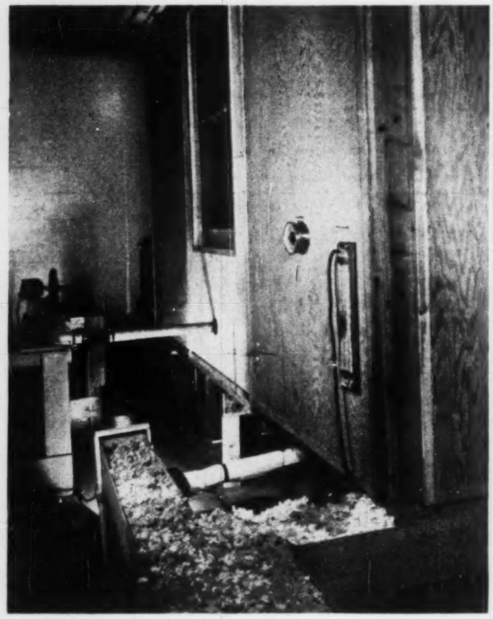

Fig. 2—Shell space and north wall of cold room

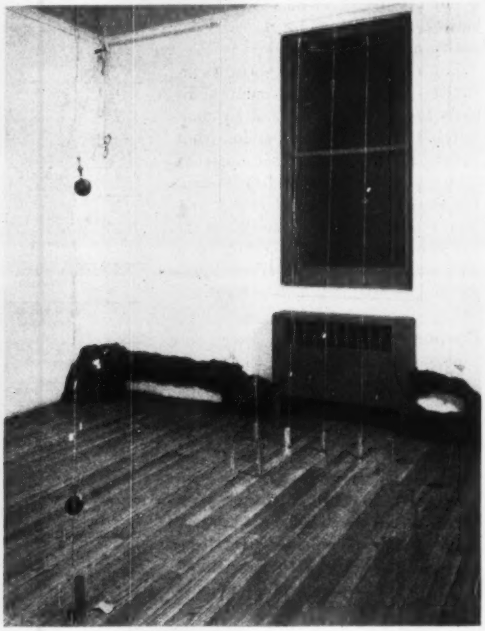

Fig. 3—Front outlet convector with enclosure height of 24 in.

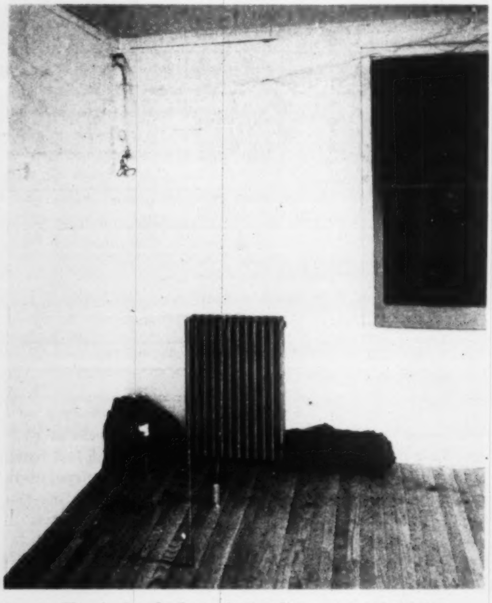

Fig. 4—Standard cast iron radiator on north wall

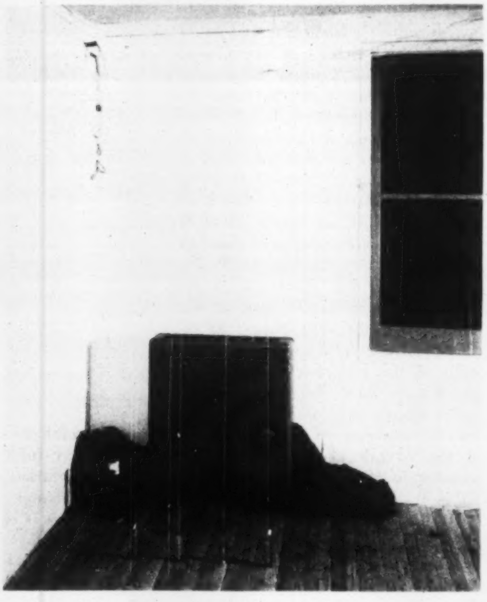

Fig. 5—Top outlet convector with enclosure height of 32 in.

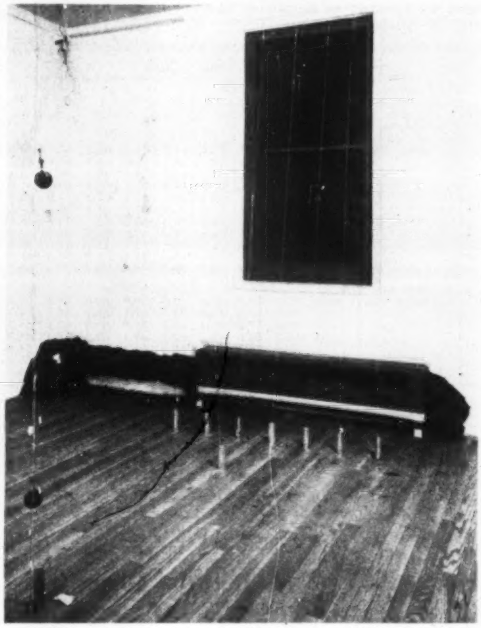

Fig. 6—Front outlet convector; height of top of enclosure of 13½ in.

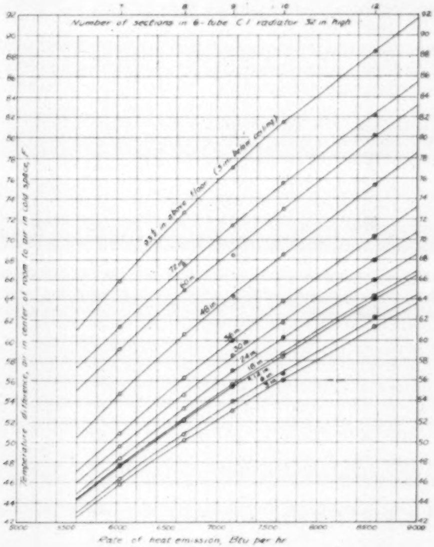

Fig. 7—Performance of standard cast iron radiators

saturation pressure at 215 F; the degree of superheat in all tests was 5 F. Condensate was collected outside of the test room in a conventional collector with an air vent.

Air temperatures were measured by copper-constantan thermocouples located at the center of the room and also in a vertical line 12 in. from the west wall at the following elevations above the surface of the floor: 3 in., 6, 12, 18, 24, 30, 36, 48, 60, 72, and 93½ in. (3 in. below the ceiling) (Fig. 3). Also globe thermometers with a diameter of 2 in. were used in the center of the room at elevations of 12 in. and 48 in. In the tests of all radiators, the air inlet temperatures were measured with shielded copper-constantan thermocouples at a height of 2½ in. above the floor and at distances of 18 in. and 36 in. in front of the center of the radiator face. (Fig. 4) In the tests of all convectors, the air inlet temperatures were measured with shielded copper-constantan thermocouples located in accordance with Section 19d, CS 140-47, at one-half the height of the inlet air grille and 18 in. in front of the convector inlet. Also, a second air inlet temperature was observed 36 in. in front of the convector inlet (Fig. 3). A high top outlet convector and a low front outlet convector under test are shown in Figs. 5 and 6.

The cast iron radiators used as the standards were 6 tubes in depth and 32 in. high. These were located as shown in Fig. 4 on the north wall between the window and the west wall. Five sizes were used with 7, 8, 9, 10, and 12 sections, with no wrapping or blocking of any sections. Each radiator was painted with a flat prime coat of medium gray oil paint and was located 1½ in. from the wall and had a total pitch of ¼ in.

The convector enclosures had top, back, and sides of 20-gage steel and fronts of 18-gage steel. The inside and outside of the enclosures were painted with a flat prime coat of medium gray oil paint. The air inlet was without grille and the air outlet was a typical deflection type grille. All units with an overall height of 24 in. or less were located under the window on the north wall, while those with an overall height of more than 24 in. were located on the north wall between the window and the west wall. A total pitch of ¼ in. was given each unit, and a small insulated copper tube vented the element continuously outside of the test room.

The convector heating elements were constructed of ½ in. O.D. copper tubes with aluminum fins. The fin thickness was 0.013 in., with 6 fins per inch, and the fin height was 2 in. on all elements. The length of each element was ⅜ in. less than the overall length of the enclosure.

The dimensions of the heating units are shown in Table 2, and the test schedules and the observed test results are given in Tables 3 to 5, inclusive. The effective heat values at different index point heights for the various heating units are shown in Tables 6 and 7.

Discussion of Results

From the tests of the cast iron radiators 32 in. high, which were used as standards, (Table 3) the curves of Fig. 7 were plotted. In this figure, the difference between the temperature of the air in the test room at a given index point and the tempera-

Table 3—Summary of Results of Tests of Cast Iron Radiators Used as Standards

	Test Number				
	1	2	3	4	5
Air Temperatures, F:					
Center of room:					
3 in. above floor	59.8	64.2	67.1	70.0	75.3
6 " " "	60.3	64.8	68.0	70.7	76.2
12 " " "	61.6	66.1	69.4	72.4	78.0
18 " " "	61.7	66.2	69.6	72.7	78.3
24 " " "	62.4	67.3	71.0	74.3	79.9
30 " " "	63.6	68.6	72.5	75.7	81.9
36 " " "	64.9	70.3	74.0	77.8	84.3
48 " " "	68.7	74.6	78.3	82.5	89.4
60 " " "	73.2	78.9	82.4	87.0	94.2
72 " " "	75.4	81.5	85.4	89.6	96.1
93½ in. above floor	79.9	86.7	91.1	95.5	102.4
12 in. from west wall:					
3 in. above floor	58.9	63.7	67.0	70.2	74.9
6 " " "	59.5	64.1	67.3	70.8	75.6
12 " " "	59.8	64.7	67.8	71.3	76.4
18 " " "	60.5	65.5	68.9	72.5	78.0
24 " " "	62.0	67.1	70.3	74.6	79.8
30 " " "	63.4	68.4	71.8	75.7	82.1
36 " " "	65.4	70.5	74.2	77.5	84.5
48 " " "	69.7	75.2	78.3	82.9	89.8
60 " " "	72.7	78.4	81.5	86.3	93.3
72 " " "	76.3	82.3	85.5	90.0	96.4
93½ in. above floor	82.1	88.8	93.0	97.0	104.3
2½ in. above floor:					
18 in. in front of radiator	61.1	65.9	68.6	72.6	77.3
36 " " " " "	59.6	64.3	68.3	70.8	75.9
Cold space near cold walls	14	14	14	14	14
Globe thermometer (center of room):					
12 in. above floor	61.7	66.3	69.6	73.1	78.5
48 " " "	67.0	72.7	76.3	80.2	86.6
Total rate of condensation, lb/hr	6.34	7.00	7.50	8.02	8.96
No load condensation, lb/hr	0.11	0.11	0.11	0.11	0.11
Net rate of condensation, lb/hr	6.23	6.89	7.39	7.91	8.85
Net rate of heat emission, Btu/hr	6033	6672	7156	7660	8570

Table 4—Summary of Results of Tests of Front Outlet Convectors and Baseboards

	Test Number								
	11	12	13	14	15	16	17	18	19
Air Temperatures, F:									
Center of room:									
3 in. above floor	66.3	62.5	64.7	63.0	63.9	61.3	61.1	64.4	59.8
6 " " "	66.9	63.7	65.9	64.2	65.1	63.0	62.7	67.0	62.2
12 " " "	68.1	65.2	67.6	65.7	66.9	64.5	64.2	68.1	63.2
18 " " "	68.7	67.0	69.0	67.1	68.8	66.1	66.3	69.5	64.6
24 " " "	70.4	68.3	70.6	68.5	70.2	67.2	67.1	70.2	65.3
30 " " "	73.2	69.4	72.5	70.0	71.4	67.7	67.4	70.5	65.6
36 " " "	75.7	70.3	73.9	71.6	72.5	68.2	68.1	70.8	66.0
48 " " "	80.5	72.7	76.3	74.8	74.2	69.8	70.6	71.6	67.2
60 " " "	83.8	74.8	78.9	76.6	77.1	72.0	72.0	72.6	68.2
72 " " "	84.3	75.2	79.7	76.6	77.3	71.8	71.9	72.4	67.5
93½ in. above floor	88.5	79.2	82.8	80.6	80.7	76.3	76.0	73.4	68.9
12 in. from west wall:									
3 in. above floor	65.8	62.0	64.3	62.4	63.4	60.6	60.6	64.8	60.2
6 " " "	66.6	64.2	65.6	64.6	64.8	62.1	63.1	66.3	61.7
12 " " "	67.1	65.0	67.2	65.2	66.7	63.9	63.9	67.5	63.1
18 " " "	68.4	66.1	68.6	66.4	68.2	65.1	65.3	68.5	63.9
24 " " "	70.1	67.8	70.3	67.8	69.9	66.1	66.3	69.5	64.8
30 " " "	72.7	68.7	71.9	69.4	71.1	66.6	67.0	69.4	65.2
36 " " "	75.9	70.6	73.7	72.1	73.0	68.4	68.6	71.0	66.2
48 " " "	80.1	72.5	76.6	74.8	75.3	70.0	70.2	71.6	67.1
60 " " "	82.1	73.7	78.6	76.3	76.2	70.7	71.6	72.4	68.1
72 " " "	85.7	75.6	80.8	78.3	78.0	72.4	72.8	73.2	69.0
93½ in. above floor	90.0	78.6	83.4	79.6	80.2	75.0	74.9	75.3	71.2
Air inlet to units[a]:									
18 in. in front of unit	67.3	63.5	65.7	63.5	64.4	61.8	61.8	65.5	61.6
36 " " " " "	66.5	63.0	65.3	63.2	64.1	61.1	60.8	65.0	60.6
Cold space near cold walls, F	14	14	14	14	14	14	14	14	14
Globe Thermometer (room center):									
12 in. above floor	68.2	65.3	67.7	65.6	66.8	64.0	63.9	67.6	62.9
48 " " "	77.4	70.4	74.2	72.2	72.7	68.1	68.3	70.2	65.4
Total rate of condensation, lb/hr	7.16	6.39	6.82	6.44	6.52	6.11	6.14	6.50	6.14
Net rate of condensation, lb/hr	7.05	6.19	6.62	6.24	6.32	5.91	5.94	6.50	6.14
Net rate of heat emission, Btu/hr	6827	5994	6411	6043	6120	5723	5752	6295	5946

[a] At one-half height of air inlet for convectors and 3 in. above floor for baseboard.

ture of the air in the cold shell space is plotted as ordinate *vs.* the net rate of heat emission of the radiator as abscissa. There are eleven curves, one for each height of the index point in the center of the room. In the test of a non-standard unit, the temperature difference at the index point (Δt) and the net rate of heat emission (q) are observed; the rate at which the standard radiator would emit heat (q_s) to maintain the same temperature differential is then read from Fig. 7. The effective heat in percent of the non-standard unit at the chosen index point is found from the relation

$$EH = 100\ (q_s/q - 1)$$

For example, (Table 4) in test 15 of the front outlet convector 20 in. high, Δt at the 24 in. level is $70.2 - 14 = 56.2$ F, and $q = 6120$ Btu per hour. In Fig. 7 the standard cast iron radiator would have to emit heat at the rate of $q_s = 7055$ Btu per hour to maintain a differential of 56.2 F at this level. The percent effective heat is 100 (7055/6120 − 1) or 15.3.

Table 5—Summary of Tests of Slant Top and Top Outlet Convectors and Non-Standard Radiators

	Test Number											
	21	22	23	24	31	32	33	34	35	36	41	42
Air Temperatures, F:												
Center of room												
3 in. above floor	66.3	66.4	63.9	69.7	61.8	63.0	59.2	61.3	73.5	77.9	61.7	62.5
6 " " "	66.7	67.8	65.1	72.2	62.0	64.1	59.9	62.1	75.4	80.0	62.5	63.5
12 " " "	68.0	69.6	66.7	74.0	63.3	65.9	61.4	63.9	77.4	82.4	63.8	64.7
18 " " "	68.6	71.5	68.4	76.2	63.7	67.3	62.9	65.3	79.3	84.5	64.4	65.6
24 " " "	70.0	72.9	69.9	77.2	64.8	68.9	64.4	66.7	80.9	85.8	65.6	66.3
30 " " "	72.3	74.5	71.5	77.9	66.4	70.7	65.8	68.4	82.2	87.2	67.0	67.6
36 " " "	75.1	76.4	72.8	79.1	68.5	71.8	66.9	69.7	83.0	88.5	68.4	69.0
48 " " "	79.9	79.4	75.6	81.5	73.6	74.7	69.8	72.1	85.2	90.7	72.0	71.7
60 " " "	84.6	82.5	78.0	83.8	78.0	77.7	71.7	75.3	88.9	94.5	75.7	74.2
72 " " "	85.2	82.3	78.0	83.4	79.2	78.0	71.6	75.9	88.2	94.5	76.8	75.7
93½ in. above floor	89.9	86.0	81.4	88.2	84.3	82.6	75.1	79.5	94.5	101.6	81.5	80.1
12 in. from west wall:												
3 in. above floor	65.7	65.6	63.3	69.1	61.2	62.0	58.4	60.4	72.5	77.1	61.4	61.9
6 " " "	66.5	67.0	65.4	71.3	61.9	63.3	59.9	61.3	74.7	79.0	61.9	62.8
12 " " "	66.9	69.2	66.6	73.4	62.2	65.2	61.4	63.0	76.8	81.6	62.5	63.9
18 " " "	68.2	70.7	67.9	75.1	63.4	66.6	62.5	64.4	78.2	83.4	63.5	64.8
24 " " "	69.6	72.5	69.6	76.4	64.3	68.6	64.0	66.3	80.0	85.0	65.4	65.9
30 " " "	72.0	74.0	71.1	77.6	66.3	70.0	65.4	67.5	81.3	86.8	66.9	67.4
36 " " "	75.3	76.1	73.2	79.2	68.9	72.0	67.2	69.7	83.1	88.5	68.7	69.0
48 " " "	80.1	78.9	75.7	81.2	74.0	74.4	69.5	72.1	85.5	91.0	72.5	71.6
60 " " "	82.5	81.6	77.1	82.2	76.8	76.5	71.0	74.1	87.0	92.9	74.7	73.1
72 " " "	85.6	84.9	79.3	84.6	79.3	78.8	72.8	76.8	89.8	95.4	77.1	76.2
93½ in. above floor	91.5	85.7	81.0	86.9	85.7	82.3	74.9	79.2	93.3	99.2	82.9	79.4
Air inlet to units[a]:												
18 in. in front of unit	67.0	66.7	63.9	69.9	63.1	63.7	59.3	61.9	74.4	78.4	63.0	64.4
36 " " " " "	66.4	66.5	64.1	69.6	62.5	63.6	59.2	61.8	73.6	78.1	61.7	63.6
Cold space near cold walls, F	14	14	14	14	14	14	14	14	14	14	14	14
Globe Thermometer (room center)												
12 in. above floor	68.3	69.3	66.8	73.4	63.6	65.8	61.4	63.8	77.0	82.0	63.9	65.0
48 " " "	77.1	76.7	73.1	79.2	71.1	72.4	67.4	70.4	83.1	88.4	69.9	70.0
Total rate of condensation, lb/hr	7.18	7.18	6.51	7.48	6.51	6.68	5.83	5.94	8.02	8.50	6.50	6.46
Net rate of condensation, lb/hr	7.07	6.98	6.31	7.28	6.40	6.48	5.63	5.74	7.82	8.30	6.39	6.26
Net rate of heat emission, Btu/hr	6847	6759	6111	7050	6198	6275	5452	5559	7573	8038	6188	6062

[a] At one-half height of air inlet for convectors and 2½ in. above floor for radiation.

Table 6—Values of Effective Heat For Front Outlet Convectors and Baseboards

Height of Index Point, in.	q	Test Number								
		11	12	13	14	15	16	17	18	19
		6827	5994	6411	6043	6120	5723	5752	6295	5946
3	Δt	52.3	48.5	50.7	49.0	49.9	47.3	47.1	50.4	45.8
	q_a	7020	6415	6760	6490	6625	6240	6215	6710	6040
	EH	2.8	7.0	5.4	7.4	8.2	9.0	8.0	6.6	1.6
6	Δt	52.9	49.7	51.9	50.2	51.1	49.0	48.7	53.0	48.2
	q_a	6990	6500	6830	6570	6710	6400	6350	7010	6280
	EH	2.4	8.4	6.5	8.7	9.6	11.8	10.4	11.4	5.6
12	Δt	54.1	51.2	53.6	51.7	52.9	50.5	50.2	54.1	49.2
	q_a	6960	6530	6880	6605	6780	6435	6395	6960	6260
	EH	2.0	8.9	7.3	9.3	10.8	12.4	11.2	10.6	5.3
18	Δt	54.7	53.0	55.0	53.1	54.8	52.1	52.3	55.5	50.6
	q_a	7010	6760	7060	6775	7025	6635	6660	7140	6420
	EH	2.7	12.8	10.1	12.1	14.8	15.9	15.8	13.4	8.0
24	Δt	56.4	54.3	56.6	54.5	56.2	53.2	53.1	56.2	51.3
	q_a	7085	6795	7120	6825	7055	6655	6640	7060	6400
	EH	3.8	13.4	11.1	12.9	15.3	16.3	15.4	12.2	7.6
30	Δt	59.2	55.4	58.5	56.0	57.4	53.7	53.4	56.5	51.6
	q_a	7270	6760	7175	6840	7025	6540	6500	6900	6280
	EH	6.5	12.8	11.9	13.2	14.8	14.3	13.0	9.6	5.6
36	Δt	61.7	56.3	59.9	57.6	58.5	54.2	54.1	56.8	52.0
	q_a	7375	6670	7140	6840	6955	6420	6405	6740	6160
	EH	8.0	11.3	11.4	13.2	13.6	12.2	11.4	7.1	3.6
48	Δt	66.5	58.7	62.3	60.8	60.2	55.8	56.6	57.6	53.2
	q_a	7410	6460	6885	6700	6630	6145	6230	6340	5880
	EH	8.5	7.8	7.4	10.9	8.3	7.4	8.3	0.7	—1.1
60	Δt	69.8	60.8	64.9	62.6	63.1	58.0	58.0	58.6	54.2
	q_a	7260	6210	6670	6405	6465	5910	5910	5970	5510
	EH	6.3	3.6	4.0	6.0	5.6	3.3	2.8	—5.2	—7.3
72	Δt	70.3	61.2	65.7	62.6	63.3	57.6	57.9	58.4	53.5
	q_a	7020	6010	6500	6160	6240	5630	5660	5710	5210
	EH	2.8	0.3	1.4	1.9	2.0	—1.6	—1.6	—9.3	—12.4
93½	Δt	74.5	65.2	68.8	66.6	66.7	62.3	62.0	59.4	54.9
	q_a	6860	5965	6295	6090	6100	5710	5680	5480	5090
	EH	0.5	—0.5	—1.8	0.8	—0.3	—0.2	—1.2	—13.0	—14.4
Average *EH* for all heights		4.2	7.8	6.8	8.8	9.3	9.2	8.5	4.0	0.2

Table 7—Values of Effective Heat for Slant Top and Top Outlet Convectors and Non-Standard Radiators

Height of Index Point, in.	q	Test Number											
		21	22	23	24	31	32	33	34	35	36	41	42
		6847	6759	6111	7050	6198	6275	5452	5559	7573	8038	6188	6062
3	Δt	52.3	52.4	49.9	55.7	47.8	49.0	45.2	47.3	59.5	63.9	47.7	48.5
	q_a	7020	7040	6625	7590	6315	6490	5950	6240	8260	9060	6300	6415
	EH	2.5	4.2	8.4	7.7	1.9	3.4	9.1	12.2	9.1	12.7	1.8	5.8
6	Δt	52.7	53.8	51.1	58.2	48.0	50.1	45.9	48.1	61.4	66.0	48.5	49.5
	q_a	6960	7140	6710	7880	6255	6560	5970	6270	8450	9290	6320	6470
	EH	1.6	5.6	9.8	11.8	0.9	4.5	9.5	12.8	11.6	15.6	2.1	6.7
12	Δt	54.0	55.6	52.7	60.0	49.3	51.9	47.4	49.9	63.4	68.4	49.8	50.7
	q_a	6945	7190	6750	7910	6270	6640	6020	6355	8480	9360	6340	6460
	EH	1.4	6.4	10.5	12.2	1.2	5.8	10.4	14.3	12.0	16.4	2.5	6.6
18	Δt	54.6	57.5	54.4	62.2	49.7	53.3	48.9	51.3	65.3	70.5	50.4	51.6
	q_a	7000	7450	6965	8210	6300	6800	6190	6520	8730	9680	6390	6560
	EH	2.2	10.2	14.0	16.5	1.6	8.4	13.5	17.3	15.3	20.4	3.3	8.2
24	Δt	56.0	58.9	55.9	63.2	50.8	54.9	50.4	52.7	66.9	71.8	51.6	52.3
	q_a	7030	7450	7015	8130	6340	6880	6285	6590	8730	9560	6440	6530
	EH	2.7	10.2	14.8	15.3	2.3	9.6	15.3	18.6	15.3	18.9	4.1	7.7
30	Δt	58.3	60.5	57.5	63.9	52.4	56.7	51.8	54.4	68.2	73.2	53.0	53.6
	q_a	7150	7460	7040	7960	6375	6930	6300	6630	8610	9410	6450	6530
	EH	4.4	10.4	15.2	12.9	2.9	10.4	15.6	19.3	13.7	17.1	4.2	7.7
36	Δt	61.1	62.4	58.8	65.1	54.5	57.8	52.9	55.7	69.0	74.5	54.4	55.0
	q_a	7295	7470	6990	7840	6450	6860	6260	6600	8390	9200	6440	6510
	EH	6.5	10.5	14.4	11.2	4.1	9.3	14.8	18.7	10.8	14.5	4.1	7.4
48	Δt	65.9	65.4	61.6	67.5	59.6	60.7	55.8	58.1	71.2	76.7	58.0	57.7
	q_a	7330	7270	6800	7540	6560	6680	6145	6395	8020	8750	6380	6350
	EH	7.0	7.6	11.3	6.9	5.8	6.5	12.7	15.0	5.9	8.9	3.1	4.8
60	Δt	70.6	68.5	64.0	69.8	64.0	63.7	57.7	61.3	74.9	80.5	61.7	60.2
	q_a	7360	7100	6570	7260	6570	6540	5875	6260	7910	8640	6310	6140
	EH	7.5	5.0	7.5	3.0	6.0	4.2	7.8	12.6	4.5	7.5	2.0	1.3
72	Δt	71.2	68.3	64.0	69.4	65.2	64.0	57.6	61.9	74.2	80.5	62.8	61.7
	q_a	7125	6800	6315	6920	6445	6315	5630	6090	7500	8320	6180	6060
	EH	4.1	0.1	3.3	—1.8	4.0	0.6	3.3	9.6	—1.0	3.5	—0.1	0.0
93½	Δt	75.9	72.0	67.4	74.2	70.3	68.6	61.1	65.5	80.5	87.6	67.5	66.1
	q_a	7015	6600	6165	6830	6435	6275	5605	5990	7540	8460	6180	6050
	EH	2.4	—2.4	0.9	—3.1	3.8	0.0	2.8	7.8	—0.4	5.2	—0.1	—0.2
Average *EH* for all heights		3.9	6.2	10.0	8.4	3.1	5.7	10.4	14.4	8.8	12.8	2.4	5.1

Conclusions

1. For each unit tested, there is one level of the index point that gives maximum effective heat. This is clearly shown in Fig. 8. For convector enclosures with the same type of air discharge, the elevation of this point increases as the height of the enclosure increases. For enclosures of the same height but with different types of air discharge, the height of the index point for maximum effective heat increases as the air is given a greater upward deflection at the outlet.

The practical significance of this result is that the height of front outlet enclosures should not exceed 20 in., while slant and top outlet convectors should be from 3 in. to 6 in. lower if maximum effective heat is desired at a low level, 24 in.

A collection of some of the results in the following table illustrates this conclusion:

Hgt. of top of enclosure above floor, in.	Outlet type	Max. effective heat, percent	Hgt. of index point for max. effective heat, in.
13½	front	16.3	24
	30° slant	16.5	18
	top	15.3	18, 24
20	front	15.3	24
	30° slant	15.2	30
	top	15.6	30
24	front	11.9	30
	30° slant	10.5	36
	top	10.4	30
32	front	8.5	48
	30° slant	7.5	60
	top	6.0	60

2. At very high and very low levels in the center of the test room, all units tested showed low values of effective heat. For all heights of front outlet enclosures, the effective heat 3 in. above the floor was between 2.8 and 9.0 percent; for the baseboards at this level, the effective heat was between 1.6 and 6.6 percent. For 30 deg slant top convectors, the values were between 2.5 and 8.4 percent; for top outlet convectors, between 1.9 and 9.1 percent.

At a point 3 in. below the ceiling, the front outlet convectors showed effective heats between -1.8 and 0.5 percent; for baseboards, these effective heats were between -14.4 and -13.0 percent. For 30 deg slant top convectors, these effective heats were between -3.1 and 2.4 percent; for top outlet convectors, between -0.4 and 3.8 percent.

3. Based upon the results of these tests, alone, a suggested table of effective heats follows.

Height of top of discharge grille, in.	Effective heat (24 in. level) for front, slant top, or top outlets, percent
8	7
10	13
12	15
14	16
18	15
20	14
21	13
22	12
23	11
24	10
25	9
26	8
27	7
28	6
29	5
30	4
31	3
32	2
33	1

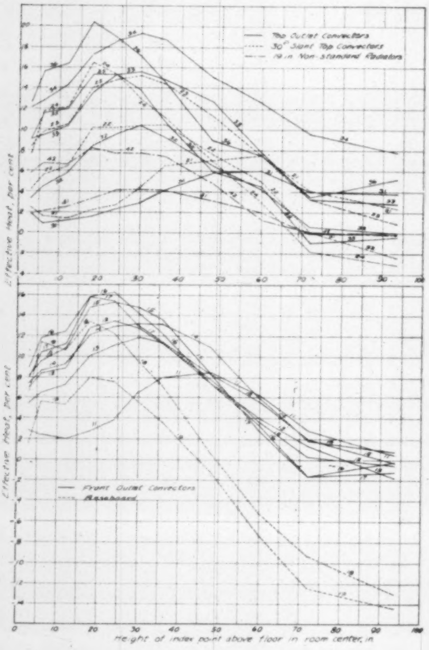

Fig. 8—Effective heat at different levels of the index point

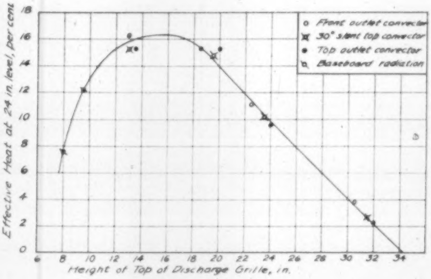

Fig. 9—Effective heat of different heating units at the 24-in. level

The principal difference between this table and the one given in Commercial Standard CS140-47 is in the performance of the slant top and top outlet convectors. For a given height above the floor of the top of the discharge grille, these tests showed no significant difference in the effective heats at the 24-in. level of different types of outlets.

In Fig. 9 are shown effective heats at the 24-in. level plotted against the height of the top of the discharge grille above the floor.

4. The effect of infiltration on effective heat of the same heating unit is not positively established because the number of tests were insufficient. However, tests 33 and 34 may be compared to show the effects of infiltration upon the same top outlet convector with an enclosure height of 20 in.; in test 33, the infiltration was at the controlled rate of 12 cfm, while in test 34, the air slots around the window admitted no air. With infiltration, the maximum effective heat was 15.6 percent, and the average effective heat at all levels was 10.4 percent; without infiltration, the maximum effective heat was 19.3 percent, and the average effective heat at all levels was 14.4 percent. It must be remembered that the performance of the convector, both with and without infiltration, is compared with the performance of the standard radiator *with* infiltration in finding these effective heats.

It is a fact that infiltration should cause a lower room air temperature and a greater rate of heat emission for a given temperature of the outdoor air *if* infiltration does not change the output of the heating unit per degree of temperature difference between heating fluid and room air. Without infiltration (test 34), the average temperature of the air in the center of the test room at all levels was 69.1 F, and the rate of heat emission was 5559 Btu per hour; with controlled infiltration (test 33), this average temperature was 66.2 F, and the rate of heat emission was 5452 Btu per hour. If infiltration of cold air above the convector decreases the rate of heat emission per degree of temperature difference between heating fluid and room air, it would be possible to get lower room air temperatures with about the same, or even lower, rates of heat emission. Apparently, there is a pronounced effect of infiltration upon this rate of heat emission. Similar results were obtained when a top outlet convector with an enclosure height of 13½ in. was tested with and without infiltration.

5. The 12 section, 6-tube, non-standard cast iron radiator with a height of 19 in. showed a maximum effective heat of 4.2 percent at a height of the index point of 30 in. when located in the same place as the standard radiator (test 41). When the 19-in. radiator was placed under the window, a maximum effective heat of 8.2 percent was obtained at a height of the index point of 18 in. (test 42). These results indicate that when the standard heating unit is placed at only one location in the test room, while the non-standard unit is tested in several different locations, different values of effective heat may be found for the same heating unit in the same room.

6. These tests show conclusively that the same structure with the same temperature of the outdoor air, the same average temperature of the air (all levels) *in the center of the structure*, the same controlled infiltration, and the same heating fluid (steam) may have different rates of heat loss with different heating units.

For the five standard cast iron radiators, the rate of heat loss from the structure has an average value of 118.9 Btu per hour for each degree of difference between the average room air temperature and the outdoor air temperature. For twelve convectors of different types and heights the corresponding average rate of heat loss is 111.7 Btu per (hr) (F deg). This difference shows the influence of the local or direct effect of the type of heating unit on the rate of heat loss. The temperature of the room surface of the wall back of the 9-section standard radiator in test 3 was found to be 146.2 F, while the temperature of the surface of the wall back of the front outlet convector in test 16 was found to be 101.3 F.

If, instead of averaging the air temperature at all levels in the center of the room in order to find the heat loss per degree of temperature difference, *one* air temperature at the 24 in. level in the room center is used, the average rate of heat loss for the five standard radiators is 128.4 Btu per (hr) (F deg), while for the twelve convectors the corresponding rate of heat loss is 116.9 Btu per (hr) (F deg). Comparison of these results shows the influence of temperature change with level within the room as well as the influence of local or direct effect of the heating unit on the heat loss.

The temperature variation with level and the local heat loss near the heating unit are characteristic of a particular type of heating unit, and both affect the rate of heat loss from a given structure.

JOURNAL SECTION

Factors Useful in Ground Grid Design for Heat Pumps

By George S. Smith*, Seattle, Wash.

THE HEAT source or sink often presents a major problem in the use of heat pumps. Where neither air nor water can be utilized, a grid of tubing buried in the earth has often been found satisfactory. On the other hand such grids have often partially or completely failed because of improper size or design. This is not surprising since the ground grid presents a new field of heat exchange design and little is known of the factors involved.

Several experimental studies of this problem have already been made or are now in progress. Perhaps no one study can result in information which can be generally used, since each will be influenced by the climate, locality, type of soil, methods, or apparatus used. However, an accumulation of such information will indicate trends and produce averages sufficiently accurate for most design purposes. Workers in this field of research should be continually aware of the need to present their results in such a manner as to be adapted by designers in any locality.

At the outset, the intent of the present study was to determine, *first*, soil thermal conductivity, *second*, undisturbed earth temperatures, and, *third*, heat-collecting coefficients for buried tubing. As the work progressed, many other factors became apparent and were included. The results indicate that the ground area necessary for any given house in a given climate, is the most important factor, whereas, the heat-collecting coefficients are important mainly in determining the minimum length of tubing needed to collect the heat.

SUMMARY—Some successes, but perhaps more failures have resulted in attempting to use a ground grid as a heat source for the heat pump. This study has attempted to supply some of the information most necessary in ground grid design and suggest methods of determining other necessary factors. One important conclusion reached was the fact that except in very unusual cases, the average city lot will not supply the heat necessary to heat the house usually built thereon. However, a properly designed ground grid should prove to be a heat source excelled only by a well or spring.

The proper design of a ground grid requires information on a number of items. Those probably most important may be listed in the following order:

First, a reasonably accurate knowledge of the maximum thermal units per unit time necessary for heating or cooling of the structure to be conditioned. This can be quite readily calculated from the house plans and Weather Bureau data, using the standard methods proposed by THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS.

Second, a knowledge of the soil characteristics. This includes type of soil, its natural density, the moisture conditions at various seasons, and covering such as grass, etc. Any subsurface moisture migration will generally add greatly to the effectiveness of ground grids unless too many neighboring systems are in use. The major portion of the experimental work and results on soil characteristics has already been presented in a paper recently published.[1] Later work still in progress has contributed little besides confirming the published results.

Third, reliable information on the heat transfer coefficients for buried tubing at various spacings, time of continued operation, etc., plus some knowledge of the effect of the surface films, and moisture migration due to temperature differences.

Fourth, the average number of hours of actual operation during the heating or cooling season. Such information will aid in selecting proper transfer coefficients, as well as in determining the total heat consumption for the year.

Fifth, annual heat absorption per square foot of soil area, resulting from the sun's radiation, plus that carried in by the rainfall. A small amount of heat for ground coils may be supplied by the earth's interior heat, though the distance of travel is so great that such an increment should probably not be relied upon except as a safety factor under extreme conditions.

This report will attempt to present information or methods of obtaining information on most of these items except the *first* and *second*.

Description of Methods and Apparatus

The determination of the heat transfer coefficients was approached primarily by theoretical calculations and checked experimentally.

Some workers have used the method of images as a means of calculation. This assumes the earth's surface as a constant temperature plane half way between the tube and its reflection at an equal distance above the surface. The curves proposed in this paper are based upon Fourier's heating equation which assumes all points at an infinite distance from the tube to remain at a constant temperature. Neither method represents an accurate solution of the actual case, and both present results more nearly accurate as the depth of the tube below the earth's surface is increased within the limits used in heat pump work.

The equipment used for this study consisted of a 2-hp compressor with the necessary equipment to supply a

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*Professor of Electrical Engineering, University of Washington.

For presentation at the 57th Annual Meeting of THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, Philadelphia, Pa., January 1951.

[1] Exponent numerals refer to Bibliography.

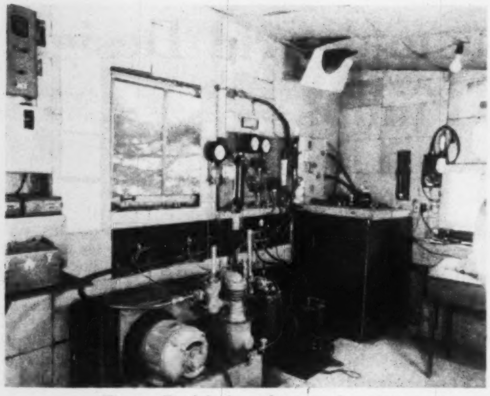

Fig. 1—Partial view of test equipment

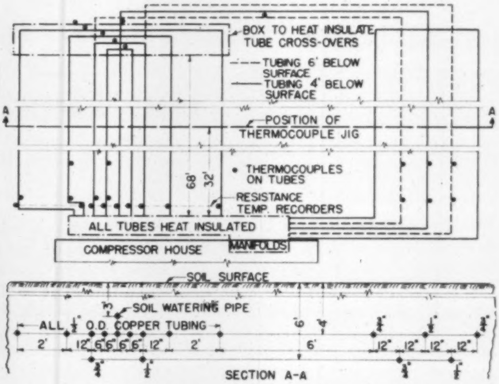

Fig. 2—Layout of tubing in ground grid

buried grid of tubing with F-12 gas at any head or suction pressures desired within the range utilized by heat pumps. Fig. 1 shows a partial view of this equipment. The quantity of F-12 flow was measured by means of a calibrated rotameter used on the high pressure side where the refrigerant is still in a liquid state. The building housing this equipment was well heat insulated and provided with a ventilating fan, as well as an electric heater, each controlled by a thermostat so that the room temperature could be controlled at any desirable point within a normal range and kept relatively constant. The temperatures of the tubes as they entered the soil, as well as those of the outside air, room air, etc., were recorded continually during tests by means of a micromax recorder, with resistance-type thermometers.

Fig. 2 presents the plan and cross section of the tubing, indicating the positions of the various loops, their lengths and depths. Each loop has a cutoff valve at either end, and the group is fed by means of a header carefully designed to equalize the flow for all loops. The loops were so placed that parallel tubes at a variety of spacings could be selected for group operation. The outgoing and incoming ends, as well as the field cross overs, were well heat insulated with mineral wool to the point where the ground measurements were to begin. One-half-inch outside diameter copper tubing was used for all of the loops except two, and these were provided with ¾-in. tubing. The major group was placed at a depth of 4 ft; however, two of the loops were placed at a depth of 6 ft.

An unusually elaborate system of copper constantan thermocouples were located in a vertical plane, the position of which is indicated in Fig. 2. A vertical section showing the tube positions and also the various thermocouple positions is shown in Fig. 3. The thermocouples were located very accurately, and held in the proper position with respect to the tubes by means of light wood strip jigs. Thermocouples were also soldered to the various tubes at intervals along their length in such a way that the point of superheating of the gas in the tube could be determined. All couples and leads were well protected with a special synthetic rubber paint and finally by a coating of alkyd resin varnish.

Temperatures were determined by means of a potentiometer located in a small temperature room, which was held at a constant temperature by electric heat. Soil moisture was determined by periodic sampling, though later a moisture cell of established calibration was used.

To determine the normal undisturbed earth temperatures at various depths and seasons, a station with 6 thermocouples at depths of from 1 to 10 ft was located about 50 ft from the test grid. Another such station was located in the back yard on the south side of the author's home about two miles from the test site. A third master station was located more than a quarter-mile away, and consisted of 12 resistance-type thermometers spaced from 1 centimeter to 15 meters below the surface. These temperatures together with air temperatures were recorded continually by means of a micromax recorder.

The length of this report will not permit a complete report on the data collected from these temperature stations, and reference will be made to only certain portions of the results. A report on another phase of this study is in progress which will elaborate these data.

Heat Transfer Coefficients

For the actual design of a ground grid the rate of heat flow from soil to tube or the reverse, for any given set of conditions, is probably the information most useful. This interchange of heat is a function of the tube diameter, tube surface conditions, the soil and refrigerant temperatures, as well as soil characteristics.

Ingersoll and Plass[2] have applied the solution of Fourier's differential equation for the flow of heat to or from an infinitely long straight line

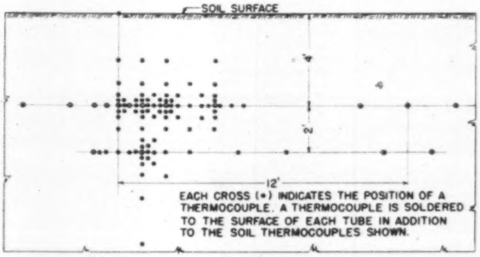
SOIL SURFACE
12'
2'
EACH CROSS (•) INDICATES THE POSITION OF A THERMOCOUPLE. A THERMOCOUPLE IS SOLDERED TO THE SURFACE OF EACH TUBE IN ADDITION TO THE SOIL THERMOCOUPLES SHOWN.

Fig. 3—Thermo-couple layout

source. This theory appeared most logical for use in our study. Thus, by using the Equation 1,

$$\frac{U}{k}=\frac{2\pi\Delta T}{I(r/2\sqrt{\alpha t})}\cdots\cdots(1)^*$$

the curves in Fig. 4 are obtained. Although these apply only in the case of a single infinite tube, they are basic in such a study.

The broken line curve indicates the relation of *U/k* and *At*, assuming the tube is kept at a constant temperature, while the unbroken line curve gives the similar relation when the heat withdrawal per unit length of tube is assumed constant. While neither curve accurately represents the field conditions, the line curve approaches the actual case very closely.

The coordinates *U/k* and *At* may at first appear confusing; however, a little study will reveal the logic of their use. Such plots can be used for any case where the conductivity and diffusivity of the soil is known, and after a given size of tubing has been selected. Curves plotted as *U* against *t* can be made only for a given type of soil and size of tube. With known soil characteristics and a given size of tubing, *U* and *t* are easily determined by multiplying each ordinate by *k* and each abscissa by r^2/α. In most cases *k* will vary between 0.4 and unity or more. For a ½ in. tube and $\alpha = 0.02$ the ratio of $r^2/\alpha = 0.0217$. For a one-inch tube the ratio would be four times as great.

The test points indicated in Fig. 4 are from experimental runs on a single loop with the return tube at such a distance that the tube can be considered an isolated tube. The points following the curve, and in most cases below, were taken with a tube temperature a little above freezing. The points ranging well above the curve were taken with the tube temperature somewhat below freezing and indicate the increased withdrawal of heat due to the added *heat of fusion* while freezing the soil moisture. Once this heat of fusion is absorbed the points would again fall back to, or near the curve.

Symbols

A = area, square feet.

$a = \dfrac{I(\delta)-I(\beta\delta)}{I(\delta)-2I(\beta\delta)+I(2\beta\delta)}$

α = thermal diffusivity = $k/c\rho$ square feet per hour.

β = spacing ratio Z/r.

c = specific heat, Btu per (pound) (Fahrenheit degree).

$\delta = \dfrac{\sqrt{\dfrac{\alpha t}{r^2}}}{2}$

e = Naperian base of logarithms.

$I(x) = \int_{x}^{\infty}\beta^{-1}\epsilon^{-\beta^2}d\beta$

k = thermal conductivity; Btu per (hour) (square foot) (Fahrenheit degree per foot).

n = number of tubes.

P = duration of the sinusoidal temperature variation, hours.

Q_1 = flow of heat per unit length of tube, Btu per foot.

Q_2 = flow of heat per unit surface — Btu per square foot.

r = radius of tube in feet.

T = temperature Fahrenheit degrees.

T_0 = maximum value of the annual sinusoidal temperature change.

ΔT = temperature differential, Fahrenheit degrees.

t = time in hours.

U = rate of heat transfer, Btu per (hour) (lineal foot).

U_1, U_2, U_∞ = rate of transfer per number of tubes indicated by subscript.

ρ = density of soil in pounds per cubic foot.

Z = distance between tube centers, feet.

Most check tests were carried on continuously for twenty-four hours or more. The value of *k* for these check points was in each case determined by the change in temperature per unit distance away from the tube surface by means of the following:

$$k=\frac{Q_1\log(r_2/r_1)}{2\pi(T_2-T_1)}\cdots\cdots(2)$$

The values of *k* thus determined are somewhat lower than those determined by the thermal conductivity tests since those calculated by Equation 2 account for a film coefficient in addition to the true conductivity.

The heat-flow equation may be modified, by means of the method of superposition, for use when two, three or more tubes are used in parallel at any given spacing ratio β. For three tubes in parallel the equation is:

$$\frac{U_3}{k}=\frac{2\pi}{2aI(\delta\beta)+I(\delta)}\times\frac{2a+1}{3}\cdots(3)$$

and for an infinite number of tubes:

$$\frac{U_\infty}{k}=\frac{2\pi}{I(\delta)+2\sum_{n=1}^{n=\infty}I(n\beta\delta)}\cdots(4)$$

Fig. 5 shows the theoretical curves calculated for three tubes operating in parallel at spacing ratios of β = 24 and 48. The points indicated are those found by experiment.

In general a grid cannot be constructed so as to be considered a single tube and in most cases would be greater than two or three parallel tubes. Rather than to attempt to derive a formula for the desired number of parallel tubes, two sets of curves were prepared. These are presented in Fig. 6, giving the ratios of heat transfer of three parallel tubes to that of a single tube in line curves, and the same ratios for an infinite grid to a single tube in broken-line curves. If the tube-spacing ratio is reasonably large and the time factor not too great the amount of heat extracted by a unit length of tube for given set of conditions can be interpolated as ac-

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*See list of symbols.

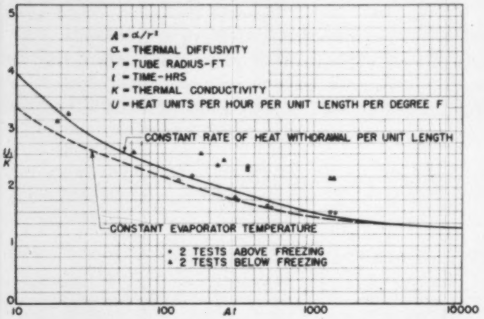


Fig. 4—Heat transfer coefficients—single isolated tube; full and broken line curves from calculations; points indicated are from tests

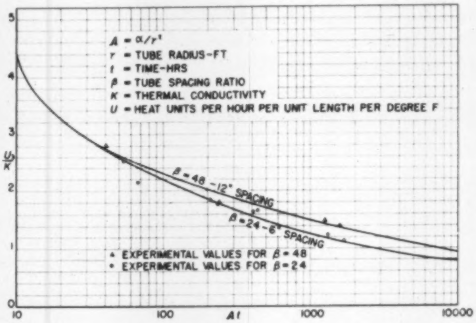


Fig. 5—Heat transfer coefficients for three parallel tubes; curves are from calculations; points indicated are from tests

curately as other necessary factors can be determined.

Tube Surface Conditions and Moisture Migration

During the studies to obtain heat transfer coefficients as well as those on soil thermal conductivity, the temperature gradients in the soil near the metal surfaces were found to be abnormal as compared to those in the main soil volume. This nonlinear temperature gradient will decrease, to some extent, the heat flow into the tube. In order to study this effect in more detail, a special soil container 7 in. in diameter and 21 in. long was used, with the covers or ends made of insulating board. A copper tube of the desired diameter and full length of the container was placed at the center of the container, and a second tube, ¼ in. in diameter, within this. A special fitting was made to carry the cooling liquid up through the ½-in. tube and let it return through the larger tube. Thermocouples were arranged to measure carefully the liquid ingoing and outgoing temperatures, and the liquid quantity was measured by timing and weighing the flow. Within the soil body a light plastic strip held thermocouples at definite distances between the tube and container walls with spacings as small as 1/16 in. near the metal surfaces. Thermocouples were also soldered to the tube and container surfaces.

Fig. 7 shows plots of the various temperatures at their corresponding distances from the center, when a tube of ½-in. in diameter was used. After 9-½ hours running, conditions were very nearly constant. On the cold side the film effect extended to less than 1/16 in., while on the outer or warm side a somewhat greater distance was involved. When the soil adjacent to the tube was not packed carefully the effect often extended to ⅛ in. or more.

The apparatus was not constructed carefully enough to permit accurate determination of thermal conductivity, but by using the k found for this soil by other methods, the relation of the true k to the apparent k_a can readily be determined. This depends upon the slope of the line drawn from the tube temperature, to the point on the true soil gradient line at the reference distance chosen. For a 2-ft spacing of tubes this distance would be 1 ft from the tube center. From these tests as well as from observations on the heat-transfer tests, the apparent conductivity up to a one-foot radius dropped on an average of 5 percent to 10 percent below the true conductivity. For a lesser radius the difference would be greater and for a greater radius the difference would be less. Time has not allowed an investigation as complete as can be desired, but from the various tests made, the same general conditions seem to prevail rather closely for various soils, and tube sizes. A larger heat withdrawal appeared to increase the effect slightly.

No direct effort was made to determine moisture migration. However, its effect could be detached in the various laboratory tests and probably accounts for the larger surface effect at the warm surface. In ground grid work moisture migration will generally aid in heat absorption for space heating, but would reverse its effect for space cooling.

Other Factors Affecting Grid Operation

The major experimental work was made at a depth of 4 ft. A preliminary installation at 2 ft was first used, and a few runs were carried out at 6 ft. So long as the soil is initially at a uniform condition, and the run is not-long enough to absorb the heat at any relatively great distance from the tube, the results seem to check quite closely. In general a tube near the surface will be more quickly affected by the atmospheric conditions above the surface and would be most desirable in a temperate climate where the sun's radiation is available during a considerable portion of the heating season. For colder climates and regions where the sky is overcast most of the heating season, a greater depth is desirable. Probably only in climates where the winter is severe and the summer very bright and warm would depths below 6 or 8 ft be desirable.

The effect of surface atmospheric conditions is clearly indicated in Figs. 8 and 9. These are plots of constant temperature surfaces about the tube. The lines originating at the tube surface which are perpendicular to each of the constant temperature curves, indicate the direction of the flow of heat. By spacing these properly each represents an equal increment of the total heat flow. Fig. 8 was taken after a 24-hour run during an exceptionally cold spell in January, while Fig. 9 was taken after a similar run when the ground was receiving a plentiful supply of heat from the spring sunshine. A series of such plots were made and offer an interesting means of studying the operating conditions as affected by the time of continuous operation by parallel tubes at various spacings, and by the atmospheric conditions above the soil surface.

A perforated tube shown in Fig. 2 was installed about 6 in. above the middle portion of the grid at a four-foot depth. During the dry summer season, about 200 gal of water was dissipated through this tube after 52 hours of continuous run when fairly constant conditions had been attained. Within 40 hours the flow of heat had increased about 35 percent and was still about 12 percent high after 286 hours continuous running. This change is largely caused by increasing the soil conductivity, but could be partially the result of heat added by water warmer than the soil. Rain during the heating season, or moisture during the cooling season is almost always advantageous.

Determination of Operating Time

The designed size of a heat pump or other heating unit must be based on the continuous heat necessary for the assumed coldest day. Operating at this output the unit will be in actual use less and less of the time, as the mild weather approaches. Hence, a knowledge of the operating time becomes very desirable. This can be determined with moderate accuracy by using Weather Bureau information. Thus Table 1 gives from 50 years of records, the average degree days for each month of the year at Seattle, Wash. The degree days for the coldest day in January for each of three unusually cold Januaries, were averaged, as the average coldest day to determine a degree day factor which would be proportional to the size of the heating unit needed. Thirty days times this average coldest day would be the equivalent monthly degree days, assuming each day equally cold. The actual average degree days for any month divided by this heating base value, times 100, will give the percentage time of operation for the heating unit.

From records of four houses in Seattle using heat pumps, the percentage of operating time was calculated and is indicated in Table 1. In two of these houses the unit was either somewhat larger than usual, or the occupants were very conservative with heat. House D appears to have too small a unit as indicated by the high percentage of operating time. In general the calculated values check reasonably well with actual operation.

Heat Available for Ground Grids

The success of a ground grid depends as much on the heat available in the volume of soil supplying that heat, as it does upon the tube size, spacing, length, depth, etc., or even more. The available heat must be supplied by the heat radiated from the sun, the heat carried into the soil by the rain, underground moisture migration and heat from the earth's center. If the heat absorbed each heating season is not on the average replenished each year, the unit will in time, fail.

Fig. 10 shows a plot of the temperatures near the tube at various periods before and during the operation of the experimental unit. Since these were taken in July they are somewhat affected by the incoming heat from the sun. During the colder portion of the year they would show temperature changes to somewhat greater distances. Fig. 10. as well as plots like Figs. 4, 5, 8 and 9, indicates that in general the heat does not travel very great distances except under extremely long operating times, and then only very slowly. This would largely elimi-

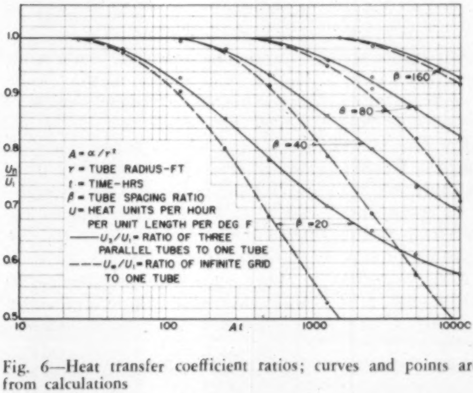
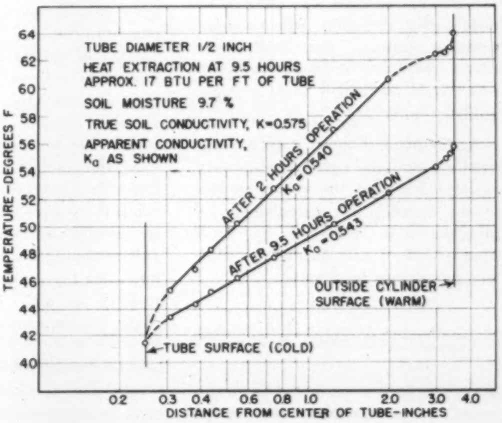


Fig. 6—Heat transfer coefficient ratios; curves and points are from calculations

Fig 7—Curves showing non-linear temperatures at surfaces



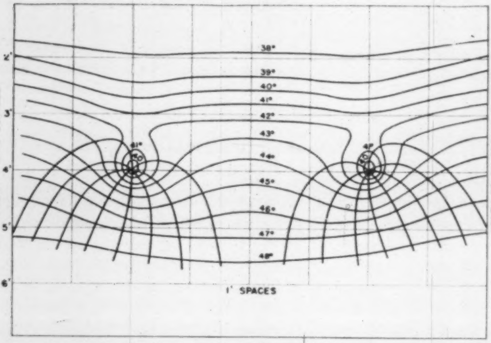


Fig. 8—Isothermal lines and heat flow paths for January; parallel tubes spaced 4 ft apart

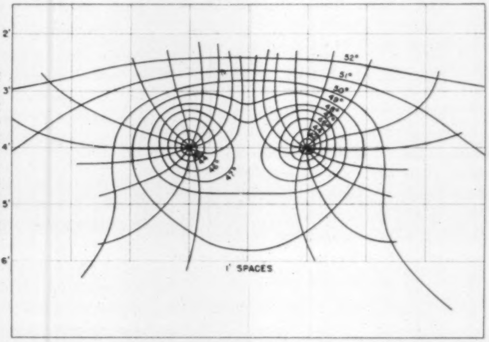


Fig. 9—Isothermal lines and heat flow paths for May; parallel tubes spaced 2 ft apart

nate the heat from the earth's center since the temperature at 30 to 50 ft remains at about the average of the yearly temperature above the surface, and the temperature at greater depths changes only about one degree for every 60 ft. This great distance and small temperature differential will result in very little heat migration.

The underground moisture migration might or might not be present. If other ground grids were near, it might be of little value or even a disadvantage. This leaves only heat from the sun and rain. To determine how much of this heat can be utilized by the ground grid would require rather extensive studies and even then could be only approximated.

From the considerable amount of information available from the temperature stations described, some rather interesting studies were made, which have resulted in some possible guiding limits.

Again using Fourier's differential equation and the cyclic temperature variations during the year, the following formula for calculating the possible heat absorbed by each square unit of soil during the summer month can be derived:

$$\frac{Q_s}{A} = kT_0\sqrt{\frac{2P}{\pi\alpha}} \qquad (5)$$

Where no heat is extracted from the earth, the temperature differential causing heat to flow into the soil must be based on the constant temperature at 30 to 50 ft below the earth's surface. Where a ground grid has extracted the heat nearer the surface the soil temperature will be at a much lower value.

Fig. 11 shows a plot of soil-solar-heat absorption calculated by means of Equation 5 using a maximum temperature, T_o, obtained by finding the equivalent sinusoidal temperature difference between the soil surface and the assumed average soil temperature. These calculations were carried out using the recorded temperatures at the surface of the soil for two summer seasons. Similar calculations were found to give approximately the same results by using 71 percent of the Weather Bureau's maximum daily temperatures instead of the actual surface temperatures, as an approximate method of analysis, and points are plotted to indicate these approximations for the same two years. Fig. 11 also presents the possible heat added due to rainfall. This curve was calculated by using the Weather Bureau's 50 years monthly average rainfall together with its corresponding monthly average air temperature, and assuming the moisture precipitated has the same average temperature as the air. The procedure in obtaining the curves in Fig. 11 will be fully presented in the paper previously mentioned.

There is no intention to intimate that the suggested method of arriving at the available stored heat is accurate and of course the figures presented apply only to the test site. In sections of the country where summer rains are frequent and the surface temperatures due to solar radiation are higher a somewhat greater heat penetration will result.

In most temperate climates any rains during the heating season probably add a considerable amount of heat that has not been accounted for in the calculations. At any time when rainfall can occur, the temperature will usually be above freezing, and with the soil somewhat below normal temperatures because of heat extraction, nearly all available heat in such precipitation will be absorbed by the soil. At the same time the average monthly temperature might appear to be so low that little or no useful addition of heat would be indicated by the method proposed.

A similar argument would apply during the winter months where bright sunshine might radiate a sizable amount of heat to the soil even when the air temperatures are rather low. Such additions might well be approximated by a careful study of U.S. Weather Bureau records which present rainfall, and sunshine conditions daily.

Until experience in each locality can determine the approximate amount of heat that can be extracted annually per square foot of surface, the method proposed, or some similar method of analysis might be used to avoid failures.

Suggestions for Application of Data

The design of a ground grid at this time still requires a number of assumptions which must be based upon the best information available. This study seems to indicate that the safest method of determining the adequacy of a given plot to supply a given heat load, is to calculate as nearly as possible the amount of heat it will probably absorb during the summer season and depend upon this stored heat for the major portion of the heating season. In most climates some heat due to the sun's radiation, as well as precipitation, will be available during most of the year, and especially in early autumn and later spring, even while heating is still required.

To illustrate some of the possibilities, assume a 10,000-Btu per hour increment as a basic heating unit for a home in Seattle. The major heating period might be considered from October 1 to April 1. Before and after those dates the additional absorption of heat due to the presence of a ground grid would probably supply the heat necessary. Between those two dates only the stored heat would be assumed available, though actually some useful heat may still be added by the sun's radiation or rainfall. From Table 1 this would require a total heating time, October 1 to April 1, of 2055 hours or 20,550,000 Btu of heat. Assume the average temperature of the body of soil involved will drop to 40 F. Fig. 11 shows that the stored heat due to the sun's radiation would be 9,500, and that due to precipitation, 1500 Btu or a total of 11,000 Btu per square foot of soil surface. The area required for this heating unit would then be slightly over 1875 sq ft or a strip about 19 by 100 ft.

Table 1 — Heat Pump Operating Time in Percentages for Seattle
(Based on Averages from 1900-1950 Weather Bureau Records at Seattle, Wash.)

Month	Degree Days	Percent of time Operating[a]	Hours Operating	Percent of Time Operating			
				House			
				A	B	C	D
Jan.	763	60	446	29	35	55	93
Feb.	635	50	360	31	54	50	69
Mar.	590	46	324	22	35	33	61
Apr.	434	34	224	19	22	31	
May	289	22	163	10	9	9	
June	157	12	86	3	7	1	
Jul.	65	5	37	0.6	3	1	
Aug.	68	5	37	1	3	1	
Sept.	169	13	93	3	5	8	
Oct.	365	29	215	11	20		
Nov.	556	43	301	22	29	43	42
Dec.	704	55	409	27	29	61	81
Total	4795		2695				

[a] Percent based on continuous operation of unit for the average coldest day in the three coldest Januaries during the last 50 years, not including 1950.
Maximum January degree days = 41.3 x 30 = 1239.

Next a grid for this plot must be designed of such tube length and spacing that it will absorb the desired amount of heat per hour under the most adverse conditions in January. The month of January will require a total of 446 operating hours, or operation about 60 percent of the time. Experience from these tests as well as reports from other tests indicate that it requires two to four times the actual continuous running time for the soil body to recover, or very nearly recover, uniform temperature conditions. Just how far down the transient curve of Fig. 4 the usual inter-

Table 2—Details on Selecting Average Degree Days for Table 1

House	Gross Heated Cu Ft	Unit hp	Heat Source	Year	Degree Days — Jan.	Degree Days Max. Day
A	10904	3	Well	1916	1056	43
B	39000	2.5	Grid	1936	1000	41
C	13000	3	Lake	1937	1032	40
D	33500	5	Spring		Avg.	41.3

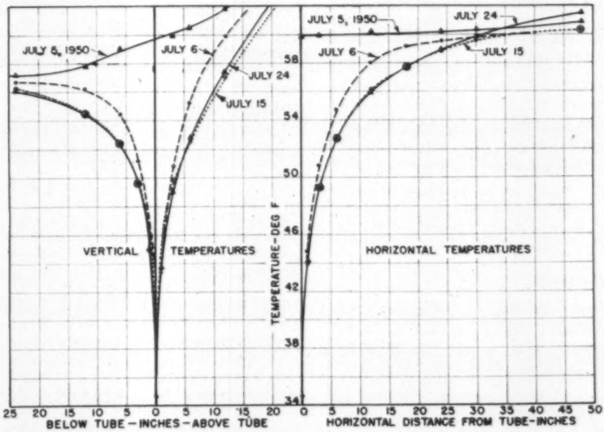


Fig. 10—Temperature gradients near tubing after various periods of continuous operation

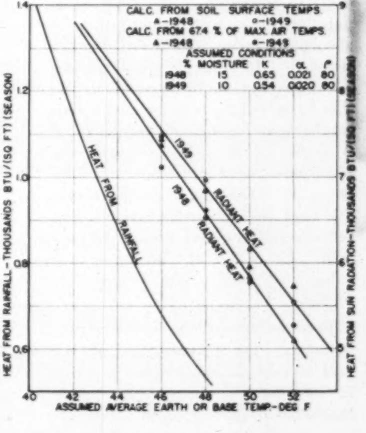


Fig. 11—Curves of soil heat absorption from solar radiations and rainfall tables

mittent operation would carry would be rather difficult to determine accurately. However, to assume that this point is well toward the portion where the curve approaches the horizontal would appear quite safe. Let us assume this would be at $At = 5{,}000$ and $U_1/k = 1.4$.

For the soil conditions during the heating season, assume a sandy soil with an average moisture content of 15 percent, a dry density of 93 lb per cubic foot. From the thermal conductivity tests, k would be about 0.95 and α would be 0.035 if the specific heat of the dry soil is assumed as 0.19. The specific heat for the moist soil would then be $0.34/1.15 = 0.295$. The film or surface conditions near the tube will have the effect of decreasing the apparent thermal conductivity, though moisture migration due to the cooled tube surface would tend to counteract such a decrease to some extent. Since there is no known method of determining the accurate extent of these effects, assume the conductivity has been lowered to 0.85, or about a 10 percent change. This is about the magnitude of change found in the experimental work described.

The heat absorption factor U_1 for single tube operation would then be the product of k and U_1/k or $0.85 \times 1.4 = 1.19$ Btu per (hour) (foot length) (degree Fahrenheit). However, to draw upon the total area, parallel tubes must be used and the absorption factor will be still further reduced. As a rough guess, assume a 2-ft spacing would be possible, and that ½-in. tubing is to be used. This would give a spacing ratio β of $24/0.25 = 96$. The heat-transfer ratio curves in Fig. 6 show the ratio at $At = 5000$, and $\beta = 96$ would fall near 0.9 as a mean between that for three tubes and for an infinite grid. Using 0.9 of the single tube value 1.19 gives a final design value of 1.1.

For the highest coefficient of performance, the temperature of the grid should be maintained as high as will produce the necessary heat. In theory this evaporator temperature should be lowered as the average ground temperature drops. Difficulties in automatically producing such adjustments will result in either periodic manual changes or a permanent setting for the critical heating period. A small amount of freezing about the tube will result in no harm and will provide a greater heat pickup per length of tubing as well as some additional heat from the *heat of fusion* of the soil moisture. Let us assume the grid surface temperature is dropped to 20 F, which for F-12 would require an evaporator pressure of about 21.1 psi. With the previous assumption that the average soil temperature would be about 40 F, the temperature differential would then be 20 deg. This would allow a minimum heat withdrawal of 20 times 1.1 or 22 Btu per hour per foot. This would require 455 ft of tubing. With five parallel tubes the 20-ft width would allow a 4-ft spacing and this would in turn increase the heat-transfer ratio factor to near that for a single tube. Thus 450 ft would appear about correct. While this grid may prove to be a little over designed, such fault is to be desired until enough practical operating experience has been accumulated to afford more accurate designs.

In general the tubing should not be placed beneath buildings or other close coverings since such soil volumes must receive heat replacements from a horizontal direction and only at the expense of adjacent plots. Severe freezing under or near buildings has resulted in considerable damage due to heaving of soil. Trees and thick vegetation coverings will also tend to reduce the annual heat absorbed by the soil. On the other hand high moisture content and subsurface moisture migration will as a rule greatly add to the available heat.

Conclusions

While accurate information for ground grid design is very difficult to obtain, and many assumptions must be made, the results definitely indicate that the average city lot is too small to support the house usually built thereon. Thus, the ground grid is practicable only where larger lots are available, or where very special soil, moisture and subsurface conditions are found. Soil densities, conductivities, etc., should be carefully chosen since the soil around a newly installed grid may require years to attain its original density. The use of vertical tubes in holes dug quite deep can be used if the spacing and number are such that a sufficient volume is uniformly drawn upon. While the greater depths may draw on greater volumes, if the heat is not returned each season the design is in danger of ultimate failure unless moisture migration at these greater depths assists by drawing from neighboring areas.

Every effort should be made to add to the present data by careful studies of both successes as well as failures where ground grids have been in actual use.

Acknowledgments

The investigation reported in this paper as well as the previously reported work on soil thermal conductivity was made possible by grants from the Bonneville Power Administration, and the Engineering Experiment Station at the University of Washington. The author wishes to acknowledge the valuable assistance of L. C. Sutherland, J. H. Whiting, R. O. Berglund, and other graduate students who carried out much of the experimental work and mathematical calculations.

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Operating Experience and Data from a Sidewalk Snow-Melting System

By L. A. Stevens* and G. D. Winans**, Detroit, Mich.

SUMMARY—Since very few performance and heat requirement data have been collected for sidewalk snow-melting installations, the actual operating results of a successful installation will be of interest. The system and method of operation are described as well as both steam and electrical consumption. Comments on design and operation are made in the conclusions drawn.

SNOW-MELTING systems for driveways, sidewalks and other paved surfaces are not new. They have been used successfully for years so that there is now no question of the feasibility of such a system. Although many successful installations, larger than the one described herein, have been made, very few operating data have been available to date.

The installation of a sidewalk snow-melting system on two sides of a modern restaurant building, situated on a corner in the business district of Detroit, and supplied with steam purchased from a local district heating company, provided an opportunity to obtain valuable operating data which are reported in this paper. The system and its operation are described and data are given for both steam and electrical consumption.

In this system there are nine prefabricated pipe grids installed in the 6-in. concrete sidewalk, with about 1½ in. of concrete above the grids (Fig. 1). Concrete pads were installed at the proper grade, as shown in Fig. 2, to support the grids during the construction period. These pads are 12 in. wide by 2 in. thick and extend the full width of the sidewalk.

There are five grids on the Clifford St. side and four on the Washington Blvd. side, as shown in Fig. 2. Balancing valves and air vents were installed on each grid.

The system was filled with a solution of anti-freeze and water to prevent freezing at —20 F. Since some anti-freezes are considered toxic, all solution supply and return mains were installed in the sidewalk instead of the basement, with access boxes over the balancing valves and air vents. The heating surface provided by this piping permitted a reduction in the amount of pipe in the grids.

The supply and return piping is 2½ in. The pipe for the headers is 2 in. and the grids are 1¼-in. pipe on 12-in. centers. All joints except those at the balancing valves are welded. There are 2723 sq ft of sidewalk surface on both sides of the building. The total heating surface of the piping in the walks is 1280.

All piping in the sidewalk was covered with ¼-in. of bitumastic before the concrete was poured to permit a slight movement of the pipe in the concrete.

Expansion loops were provided in the supply and return piping, as shown in Fig. 3. These were covered on the sides of the pipe with air cell insulation before the concrete was poured to provide free movement of the pipe at these points. The air cell insulation crushes upon movement of the pipe, thereby leaving a space between the pipe and concrete. Reinforcing wire also was installed over the piping before the concrete was poured.

Fig. 4 is a diagram of the equipment that is installed in the basement

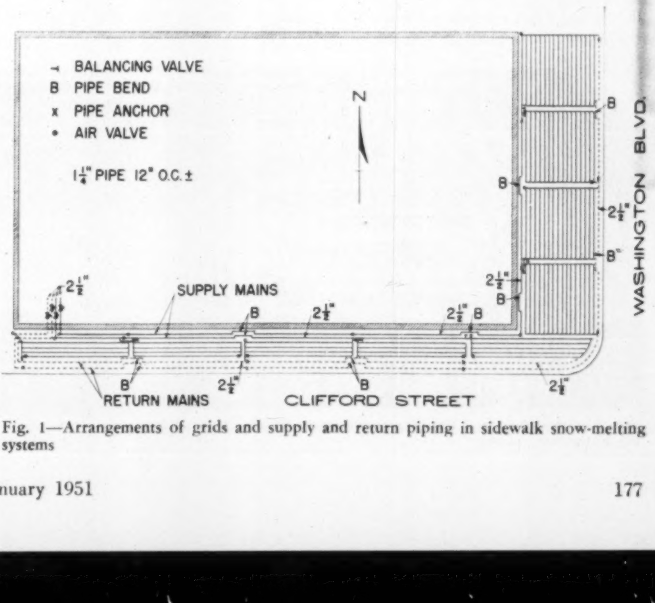

Fig. 1—Arrangements of grids and supply and return piping in sidewalk snow-melting systems

for each of the two systems. Before erection, the equipment was assembled on the floor. This assembly is shown in Fig. 5. The equipment was the same for each of the two systems and includes the following:

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For presentation at the 57th Annual Meeting of THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, Philadelphia, Pa., January 1951.

1. Heat exchanger having a capacity of 8450 gal per hour with a 20-deg temperature rise using steam at atmospheric pressure.
2. Expansion tank, 13 in. in diameter by 50 in. long.
3. Water pressure relief valve to discharge to floor drain.
4. Water circulating pump equipped with a ½-hp motor.
5. Solution temperature control valve on the steam supply.

Table 1—Summary of Data for Snow-Melting System
(Winter 1949-50)

Hours of Operation	Steam Consumption Pounds	Electric Consumption Kwhr	Snowfall Inches	Remarks
25½	13,175	10.0	2.6	Steam on beyond snowfall
3½	2,702	3.5	1.1	Steam on during snowfall only
6½	4,764	2.0	2.0	Steam on during snowfall only
4¾	3,864	3.0	2.0	Steam on during snowfall only
1¼	1,539	0.5		No snow — threat of snow
2½	2,383	1.5	0.7	Steam on during snowfall only
18¾	9,550	6.5	4.0	Steam on beyond snowfall
¼	244		trace	
1¾	1,538	1.0	trace	
3¼	2,515	1.0	trace	
5½	3,715	3.0	2.7	Steam on during snowfall only
11	6,624	4.0	2.6	Steam on beyond snowfall
26¼	13,401	11.0	5.0	Steam on beyond snowfall
½	582		trace	
8¼	5,948	1.0	2.0	Steam on during snowfall only
16¾	10,209	8.0	3.6	Steam on beyond snowfall
4	2,928	2.5	2.0	Steam on during snowfall only
2¼	1,837	1.0	0.6	Sleet, rain, showers, and snow
4	3,094	1.0	4.6	Steam on during snowfall only
4¾	3,377	3.0	2.1	Steam on during snowfall only
4	3,956	1.0	2.5	Steam on during snowfall only
Total 155.25	97,947	64.5	40.1	

Anti-freeze is put into the system at openings in access boxes in the sidewalk. A removable hose connection, as shown in Fig. 4, is used to add water, because permanent connections between city water supply piping and snow-melting systems are not permitted.

Details of the operation of the snow-melting system during two snowstorms follow:

Snow began falling on January 6, 1950, at 5:45 a.m. and at 6:30 a.m., after some snow had accumulated on the sidewalks, the snow-melting systems were turned on. At 9:00 a.m., although the sidewalks were wet, all snow was melted. Snow continued until about midnight for a total snowfall of 4 in. The systems were turned off at 12:30 a.m. Outdoor temperature on January 6 ranged from 25 to 28 F.

A total of 9550 lb of steam was consumed during the 18-hour period. The maximum hourly use was 1013 lb, or 0.37 lb per sq ft of sidewalk surface. The total electric consumption for the period was 6.5 kwhr. These results were satisfactory to the user, but would have been more so if the system had been started when the snowfall began. Supply and return solution temperatures for the Clifford St. system were 135 and 125 F, respectively; and for the Washington Blvd. system 135 and 120 F, respectively.

On February 13, 1950, there was a 5-in. snowfall starting at 4:45 a.m. and continuing until 12:30 p.m. From 12:30 to 1:00 p.m. freezing rain and sleet fell, and then rain started falling at 1:30 p.m. By midnight of the 13th, 1.88 in. of sleet and rain had fallen. From midnight of the 13th to midnight of the 14th, there were 1.92 in. of rainfall.

At 6:15 a.m. on February 13, two hours after the snowfall began, the snow-melting systems were turned on and left on until 8:30 a.m. of the 14th — a total time of 26¼ hours.

During the first part of the period, when snow or sleet was falling, the outdoor temperature varied from 26 to 30 F, and did not get above freezing until after midnight of the 13th. At 9:00 a.m. of the 14th the outdoor temperature was 34 F. Had the system not been in operation, it is probable that the rain would have frozen on the sidewalk. The total steam consumption for this period was 13,400 lb. The maximum hourly steam consumption was 845 lb, or 0.31 lb per sq ft of sidewalk surface. The total electric consumption of the two water circulating pumps was 11 kwhr for the 26¼-hour period. Here again, the performance was satisfactory to the user, but would have been more so if steam had been turned on earlier.

The curves in Fig. 6 indicate hourly steam consumption data for the entire building as well as for the two snow-melting systems during this period.

On another day when there was no precipitation, the systems were operated for 9 hours to determine the

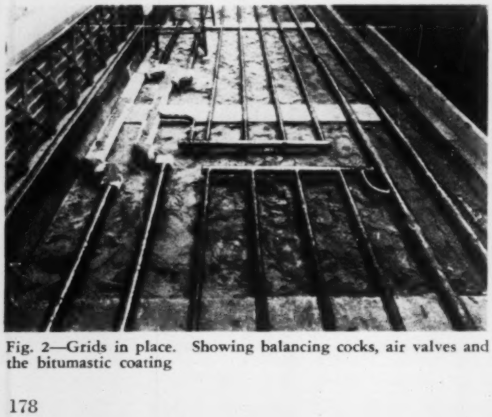

Fig. 2—Grids in place. Showing balancing cocks, air valves and the bitumastic coating

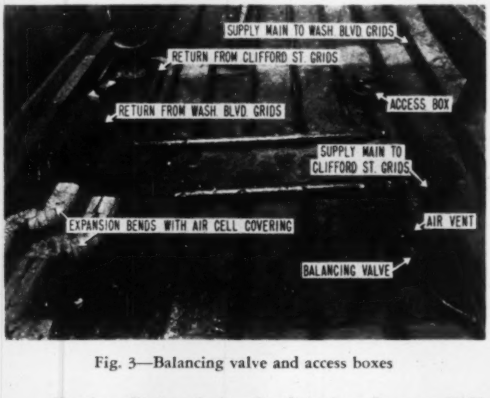
SUPPLY MAIN TO WASH BLVD GRIDS
RETURN FROM CLIFFORD ST. GRIDS
RETURN FROM WASH. BLVD. GRIDS
ACCESS BOX
SUPPLY MAIN TO CLIFFORD ST. GRIDS
EXPANSION BENDS WITH AIR CELL COVERING
AIR VENT
BALANCING VALVE

Fig. 3—Balancing valve and access boxes

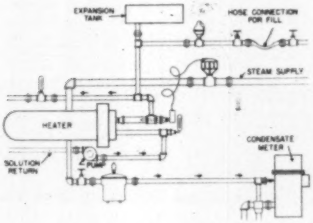

Fig. 4—Diagram of snow-melting equipment at heater

steam consumption under these conditions. The systems were started at 6:00 a.m. with an outdoor temperature of 17 F and operated until 3:00 p.m. when the temperature had risen to 36 F. The temperature of the solution being circulated was 100 F.

The total steam consumption for the 9-hour period was 2350 lb with the maximum hourly use being 340 lb, or 0.125 lb per sq ft of sidewalk surface. The electric consumption for this period was 7 kwhr.

The amount of pipe surface and the size of other equipment in a snow-melting system could be reduced if the system were operated continuously. The system in this report was in actual operation for 155 hours for the entire season, which we may consider from November 15 to March 31, or 3288 hours. It would appear that, if a system were operated continuously, about 3100 hours of this operation would not be necessary. From the test figures above, this would mean 3100 × 0.1250 lb = 387 lb steam per sq ft of sidewalk would be wasted.

The total snowfall in Detroit during the winter of 1949-50 was 40.1 in. The total steam consumption of the snow-melting system was 97,947 lb and the electric consumption 64.5 kwhr, as shown in Table 1 for the winter of 1949-50.

At another restaurant in Detroit, owned by the same company, it was necessary to have a man at the entrance to mop up the slush tracked in by patrons. This was not necessary at the new building provided with the snow-melting system.

Some additional surface should have been installed under the revolving door since, during the snowstorms, a small amount of snow collected just outside of the revolving door.

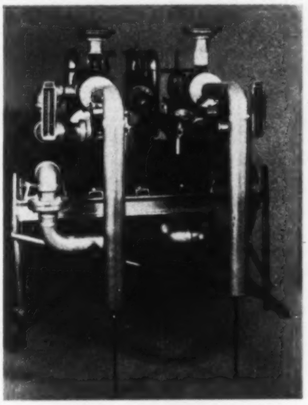

Fig. 5—Assembly of equipment before erection

No provision was made to drain the melted snow from the sidewalk. The water evaporated about as fast as the snow melted.

Conclusions

Some conclusions regarding installation and operation of snow-melting systems based on this installation are:

1. There is no need to provide drainage for the melted snow.
2. Solution heaters should be capable of condensing 0.4 or 0.5 lb of steam per hour per square foot of sidewalk surface.
3. The steam and electric consumptions are reasonable.
4. Although not determined in this test it is obvious that where salt is used to melt ice and snow on sidewalks bordered by grass or shrubs, a snow-melting system would eliminate the need of the salt which would be injurious to plant life.
5. It is desirable to operate the snow-melting systems only when there is snow on the walk or when snow is falling.
6. There is a need for a simple control which would start operation of the system when a snowfall begins and turn it off when the snowfall is ended and the sidewalks are free of snow.
7. A snow-melting system insures cleanliness in entrances and lobbies during snowfalls.

Acknowledgment

The authors extend their appreciation to all who have participated in the design and installation of this snow-melting system and in the preparation of the paper, including A. J. Caughey, heating engineer, The Stouffer Corp., the contractor, Galvin Plumbing and Heating Co., and its foreman, John C. Ritter, and to C. Howard Crane and Associates, Inc., architects.

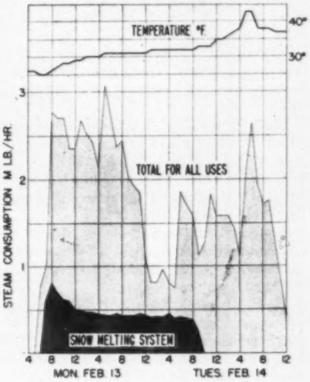

Fig. 6—Hourly steam consumption data

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RESEARCH CHEMISTS PRODUCE SEALING SUBSTANCE

A material which remains liquid as long as a stream of air bubbles through it, but which hardens in a few minutes when away from air, has been developed in the chemistry divisions of the General Electric Co. Research laboratory, according to Dr. C. G. Suits, General-Electric vice president and director of research. Its properties are thus opposite to those of paint, which hardens when exposed to air. This new material is able to penetrate extremely small cracks before hardening. Thus, a possible application is a tight seal for stopping nearly invisible leaks, or a "pipe dope" for sealing threaded joints.

The laboratory scientists responsible for the new development are Dr. Robert E. Burnett and Birger W. Nordlander. They call the substance "anaerobic permafil," borrowing a word from the biologists. The term "anaerobic," which means "nonairliving," was coined by Louis Pasteur. It is used by bacteriologists to designate organisms that remain inactive in the presence of air, but which thrive and propagate when air is absent.

Anaerobic permafil, explained Dr. Suits, remains liquid as long as it is aerated. When away from air it solidifies quickly, without heating, or adding catalysts and accelerators.

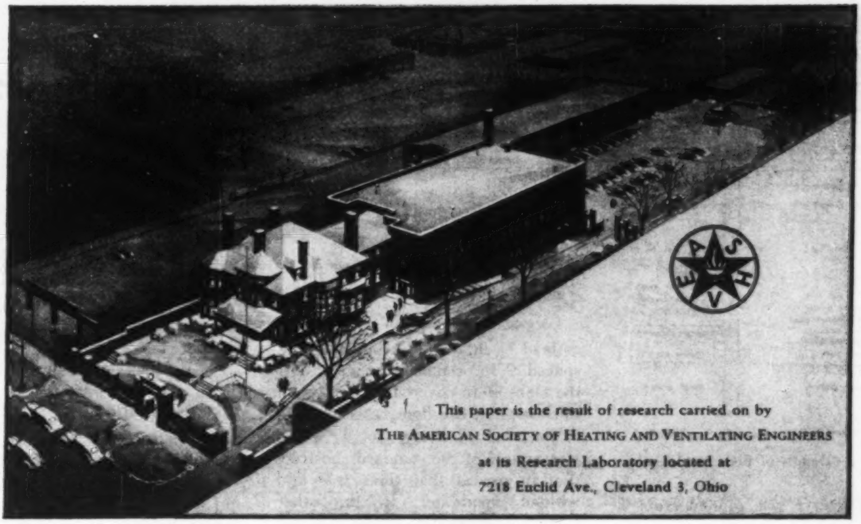
When two metal strips are coated lightly with it and clamped together the joint will support ten pounds after ten minutes. After 20 hours, it will hold 100 pounds. If still faster hardening is desired, the permafil may be heated, up to 212 F, and solidification takes place in a minute or less.

The chemists found that certain metals, such as copper, iron, and silver solder, exert an accelerating action on the hardening process, even at room temperature. Therefore, they can be sealed more quickly than surfaces of glass and mica, which are inert; though they, too, can be tightly fastened.

One proposed use of anaerobic permafil is to eliminate the lock nut needed to hold another nut tightly on a bolt. A few drops are placed on the threads of the bolt just before the nut is screwed on. The plastic hardens so tightly that very considerable force is required to remove the nut.

Another use is for sealing against leaks. The material may be applied to threaded joints in pipes, where the liquid penetrates into the crevices and then hardens. Also, if painted on porous castings, it enters the pores and renders the casting airtight.

Dr. Suits said that anaerobic permafil is still the subject of experimental investigation, and thus far only limited laboratory quantities have been produced, so it is not yet available in commercial quantities.



This paper is the result of research carried on by
The American Society of Heating and Ventilating Engineers
at its Research Laboratory located at
7218 Euclid Ave., Cleveland 3, Ohio

Field Studies of Heat Losses from Concrete Floor Panels

By C. M. Humphreys,[*] C. V. Franks[**] and L. F. Schutrum,[†] Cleveland, Ohio

SUMMARY—During the summer of 1949, thermocouples and heat flow meters were installed under four houses to study the heat losses from floor panels to the earth. Different kinds and amounts of insulation were placed under the floor slabs. The results of the tests in these four houses during the 1949-50 heating season are reported, and some details of instrumentation are given.

The Society, through the Committee on Research, is engaged in a comprehensive research program on panel heating, the general direction of which is under the Technical Advisory Committee on Panel Heating and Cooling. As a part of this program the Society's Research Laboratory carried on a field study during the 1949-1950 heating season to determine the order of magnitude of heat losses from floor slabs to the earth and to study the effectiveness of insulation in reducing these losses.

Four single story basementless frame houses were used for these tests. The houses are located in Parma Heights, Ohio, and are identical in size and arrangement, except that the floor plans of alternate houses are reversed. An exterior view of the four houses is shown in Fig. 1. All of them were occupied during the period of these studies.

The calculated heat loss for each house, based on inside and outside temperatures of 70 F and zero F respectively, was 26,500 Btu per hour. In some of the houses, heat losses were reduced during the heating season by the installation of storm windows.

Thermostats in all four houses were set at 75 F, and except in very mild weather, this temperature was maintained within about ± 1 F.

A curve giving degree days throughout the test period is shown in Fig.

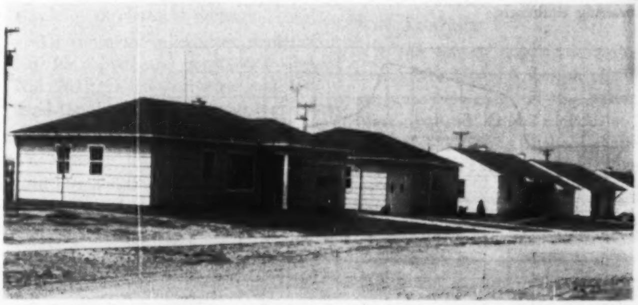


Fig. 1—View of test houses

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[**] Research Fellow, ASHVE Research Laboratory. Member of ASHVE.

[†] Assistant Research Engineer, ASHVE Research Laboratory. Junior Member of ASHVE.

For presentation at the 57th Annual Meeting of The American Society of Heating and Ventilating Engineers, Philadelphia, Pa., January 1951.

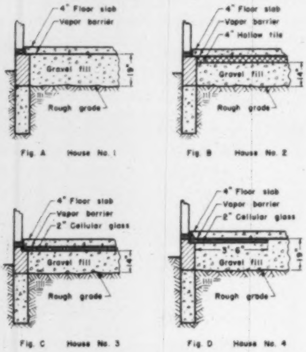

4" Floor slab
Vapor barrier
4" Hollow tile
2" Cellular glass
Gravel fill
Rough grade
18"
14"
3'-6"

Fig. A House No. 1 Fig. B House No. 2

Fig. C House No. 3 Fig. D House No. 4

Fig. 2—Details of floor insulation

Table 1—Slab Insulation

Insulation Installed between	Type and Amount of Insulation Used			
	House No. 1	House No. 2	House No. 3	House No. 4
Slab and fill	None	4 in. Hollow Tile	2 in. Cellular Glass Block[a]	2 in. Cellular Glass Block[b]
Slab and top of foundation	None	None	2 in. Cellular Glass Block	2 in. Cellular Glass Block
Slab edge and frame wall	None	None	None	Cellular Glass Block

[a] Under entire house.
[b] 3 ft 6 in. wide border around perimeter of house.

6. This curve was plotted from 3-day averages.

Panel Construction and Insulation

The floor panels in all four houses were identical and consisted of 4 in. concrete slabs containing sinuous coils of ½ in. nominal copper tubing spaced 9 in. center to center. All the slabs were covered with a ⅛ in. thick asphalt tile floor.

The slab in house No. 1, which was typical of the standard construction in use at that time, was laid without insulation. In the other three houses insulation was installed between the fill and the slab as indicated in Table 1. A vapor barrier of 30 lb saturated slaters felt was provided between the slab and the gravel or the insulation.

Details of insulation installation are given in Fig. 2. As shown in the drawings, the gravel fill under all of the houses was unusually deep.

Instrumentation

As soon as the concrete foundations were poured to rough grade, work was started on the installation of thermocouples and heat flow meters. Five groups of thermocouples, designated by letters A to E inclusive, were installed in and under the floor slab of each house. Their approximate locations are shown in plan view in Fig. 3. The vertical distribution of the thermocouples in each group is shown in Fig. 4.

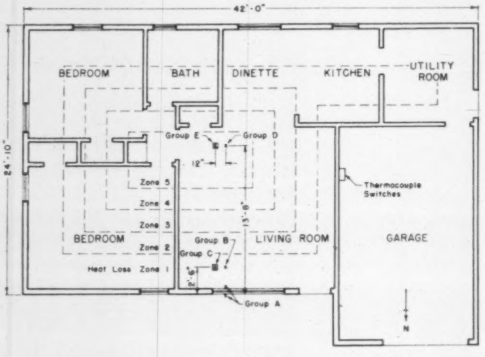
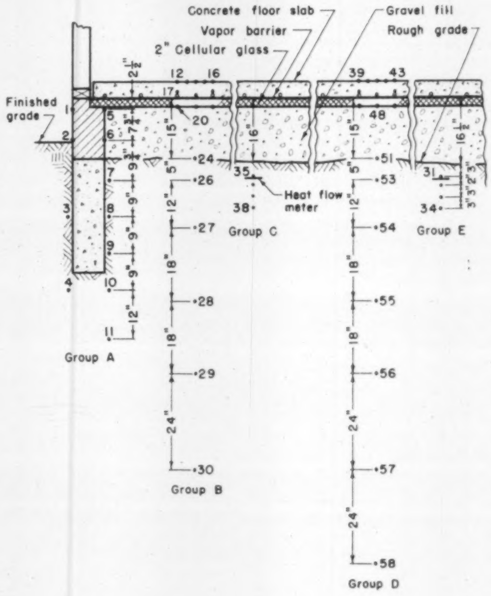

42'-0"
24'-10"
BEDROOM
BATH
DINETTE
KITCHEN
UTILITY ROOM
Group E
Group D
12"
Zone 5
Zone 4
Zone 3
Zone 2
Heat Loss Zone 1
13'-6"
BEDROOM
Group B
Group C
LIVING ROOM
GARAGE
Thermocouple Switches
Group A
N

Fig. 3—Typical floor plan showing approximate location of metering equipment


Concrete floor slab
Vapor barrier
2" Cellular glass
Gravel fill
Rough grade
Finished grade
Heat flow meter
Group A
Group B
Group C
Group D
Group E
12
16
17
20
24
26
27
28
29
30
35
38
39
43
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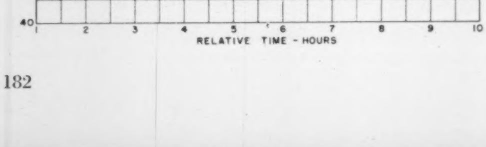

Fig. 4—Section showing location of thermocouples in house No. 3

Fig. 5—Typical temperature cycle from house No. 3

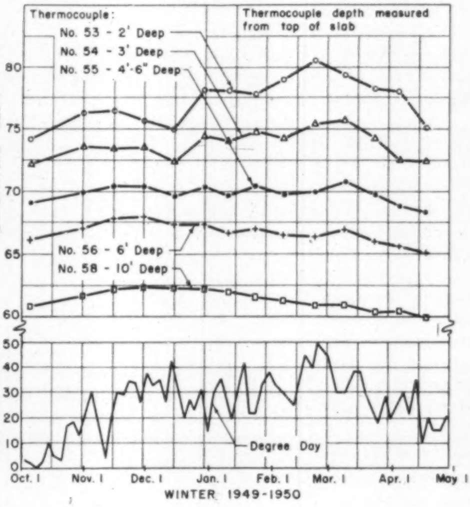

Fig. 6—Sub-slab temperature variations at center of house No. 2

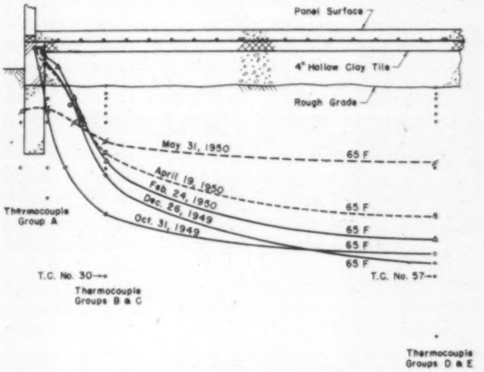

Fig. 7—Variation in location of the 65 F isotherm under house No. 2

Group A includes thermocouples 1 to 11 inclusive, which were located along the inside and outside of the foundation wall. Couples 1, 2, 5 and 6 were imbedded in the mortar joints as the brick portion of the foundation was laid. Other couples in this group were installed in holes along the concrete portion of the foundation.

Thermocouple groups B and D extend to depths of approximately 8 and 10 ft, respectively, below the top of the floor slab. These groups of couples differed slightly in the four houses as required by the different slab insulations. The couples below rough grade were installed by attaching them to a wood pole ½ in. square and placing the pole in a hole bored into the earth with a 2 in. auger. The hole was then filled with dry sand.

Groups C and E each consist of a heat flow meter and four thermocouples, one of which is in contact with the meter. These were installed to obtain a direct method of measuring heat flow and to provide a means of determining the thermal conductivity of the earth. The thermocouples under the meters were installed without disturbing the earth.

Leads from the thermocouples and heat flow meters in each house were run under the gravel fill to the garage, where a suitable switching panel was installed.

Special care was taken to protect underground and concrete-imbedded wiring from moisture damage. All thermocouple wires and heat flow meter leads were given two coats of a waterproof lacquer. Each thermocouple and its leads were then encased in a small plastic tube, the bottom of which was heat-sealed. The heat flow meters were given several dip coats of a heavy asphalt paint. These precautions were warranted for there was no evidence during the tests of any failures due to moisture. It was found when the thermocouples were first connected that both heat flow meters and one thermocouple on house No. 1 were dead, but this was undoubtedly the result of mechanical damage.

All thermocouples were made of No. 26 copper and constantan wire. No. 26 gage copper wire was also used for the heat flow meter leads.

A portable precision potentiometer was used to take thermocouple and heat flow meter readings.

Collection of Data

Readings of all thermocopules and heat flow meters in each home were taken at approximately two-week intervals from October 5 to May 31. On each visit the air temperature was also taken in the living room near the thermostat located at the 60 in. level.

Since temperatures and heat flow rates were found to be subject to constant variation, a 16-point electronic recording potentiometer was installed in each of the houses for approximately two weeks to obtain a complete record of these cyclic effects. Continuous records of the two heat flow meters and 14 selected thermocouples were thus obtained.

Additional data on edge losses were obtained for each house by temporarily attaching a heat flow meter to the exterior of the foundation wall above grade and connecting it to the recorder for a few days in place of one of the thermocouples.

Soil Analysis

A test boring was made between houses Nos. 3 and 4, and mechanical analyses were made of the soil samples removed from each foot of depth. The results of these analyses are shown in Table 2.

Results

The downward heat flow at any point under a floor panel is dependent upon a complex temperature pattern. This pattern varies with the continually changing outdoor

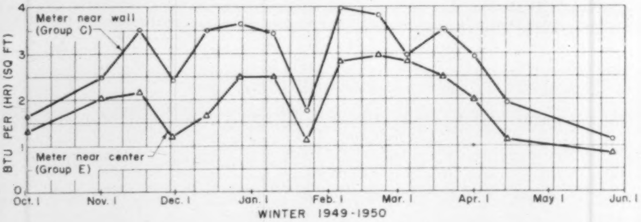

Fig. 8—Heat flow rates from heat flow meters in house No. 2

temperature, the cyclic operation of the heating system, and the thermal conductivity of the soil. Even the soil conductivity may vary from week to week with changes in moisture content.

The cyclic effect of the intermittent operation of the heating system is illustrated in Fig. 5. Although the amplitude of the variation at the tube is relatively large, its period is of such short duration that the effect is quite shallow. In contrast to this, a change in weather from mild to cold or vice versa will produce a cycle of relatively low amplitude, but because of its much greater period, its effect may extend to a considerable depth below the slab.

Fig. 6 shows the variation in earth temperatures under house No. 2 throughout the heating season. These temperatures were taken by a group of thermocouples (Group D, Fig. 3) located near the center of the house. It will be noted that the temperature at a depth of 4 ft 6 in. remained approximately constant throughout the year. Above this level the temperatures show a gradual rise until about March 1. Temperatures below the 4 ft 6 in. level reached a peak about December 1 and showed a steady decrease from that date to the end of the heating season.

The same decrease in deep soil temperatures is shown in Fig. 7 by the progressive rise of the 65 F isotherm under house No. 2. The effect of outside air and ground temperatures on ground temperatures just inside the foundation is also indicated by the shape of the isotherms near the wall.

In a similar study[1] by A. B. Algren, ground temperatures to a depth of 6 ft below the slab increased steadily during the heating season.

In keeping with the temperature variations discussed previously, heat flow meter readings indicated variations in heat flow rates from week to week. Fig. 8 shows results for the season obtained from heat flow meters in house No. 2. It will be noted that there was a general increase in heat flow until approximately March 1. This is consistent with the data presented in Fig. 6 which indicate an increasing difference between the shallow and deep ground temperatures until approximately the same date.

Table 2—Soil Properties

Depth below Rough Grade ft	Fercentage of Dry Weight		Moisture Content Percentage of Dry Weight
	Gravel and Sand	Silt and Clay	
1	22.4	77.6	13
2	23.6	76.4	14
3	27.8	72.2	15
4	36.3	63.7	14
5	39.0	61.0	not determined

Because of the many uncontrollable variables involved, downward heat losses from the panel were computed from average seasonal values. Figs. 9 and 10 show the average seasonal isotherms under houses Nos. 2 and 3, respectively. It will be noted that ground temperatures under the insulated slab in house No. 3 are lower, and that the isotherms are farther apart, than in house No. 2.

On Figs. 9 and 10, the direction of heat flow at two locations under the slab is shown by dotted lines drawn normal to each of the isotherms crossed. The heat flow line noted D at the left of each figure passes

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[1] Ground Temperature Distribution with a Floor Panel Heating System, by A. B. Algren (ASHVE TRANSACTIONS, Vol. 54, No. 1343, 1948).

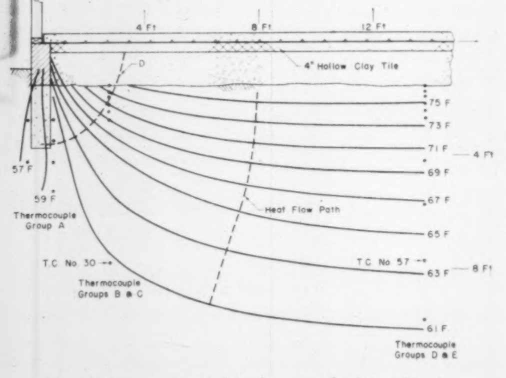

Fig. 9—Average seasonal isotherms under house No. 2

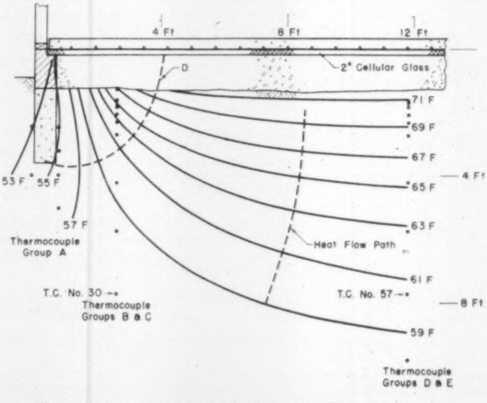

Fig. 10—Average seasonal isotherms under house No. 3

through the bottom of the foundation. It is evident from the figures that all of the downward heat flow from that part of the slab between the foundation and the intersection with line D must pass through the foundation. The loss for this part of the slab (heat loss zone No. 1 shown by dotted lines on Fig. 3) was calculated from the thermal conductivity of the foundation and the temperature drop across it.

Fig. 11 shows the average seasonal temperature drop across the foundation walls for all four houses. The effect of the edge insulation in houses Nos. 3 and 4 is also evident.

The center of the floor slab was arbitrarily divided into several zones of approximately uniform heat loss as shown in Fig. 3. The heat loss from each of these zones was calculated from the soil thermal conductivity and the spacing of the isotherms.

The average thermal conductivity of the soil under houses Nos. 2, 3 and 4 was calculated from the heat flow meter readings and the soil temperatures at known distances from the meters. Since the flow meters in house No. 1 were inoperative, the conductivity of the soil under it was assumed as the average of those determined for the other three houses. The values so determined agreed well with the thermal conductivity of (6.6 ± 25 percent) Btu per (hr) (sq ft) (deg F per inch) obtained on the basis of mechanical soil analysis from a recent bulletin[2] from the University of Minnesota.

A summary of the average ground heat losses for the four houses for the period from Oct. 5 to Apr. 19 is given in Table 3. A comparison of the losses from the several zones indicates that the major part of the loss from a floor panel takes place from a comparatively narrow band around the edge. It is in this area that insulation will pay its greatest dividends.

Total gas consumption for each house was obtained from gas company records. These total consumption values were corrected on the basis of the average summer consumption for each house, to obtain the net Btu input to each of the heating systems. The Btu output of each boiler from October 5, 1949 to April 19, 1950 was calculated on the assumption of 75 percent efficiency and compared to slab losses for the same period. The ground heat losses, expressed as a percentage of the boiler output, averaged approximately 33 percent for houses Nos. 1 and 2, and approximately 25 percent for houses Nos. 3 and 4.

Discussion of Results

Data have been presented on the heat losses from floor panels in four houses. When examining these data it is well to consider some modifying factors which, although they cannot be evaluated, do have a material effect on the heat losses.

It has long been recognized that the type of occupancy can materially affect fuel consumption and heating system performance. Although the occupancy was a factor over which the Laboratory had no control, it was hoped that it would be similar in all houses. Actually it varied so widely that it is considered worthy of note.

Table 3—Heat Losses from Floor Slabs

Zone Nos.	House No. 1	House No. 2	House No. 3	House No. 4
	Zone Areas, sq ft			
1	362	356	422	463
2	199	199	179	163
3	120	121	110	104
4	88	89	78	72
5	71	75	51	38
	Average Heat Losses, Btu/(sq ft) (hr)			
1	8.53	8.88	4.71	4.44
2	3.05	3.10	1.50	3.35
3	1.95	2.10	1.10	2.90
4	1.62	1.80	1.00	2.60
5	1.50	1.70	1.00	2.20
	Total Average Zone Losses, Btu/hr			
1	3090	3160	1990	2057
2	609	617	268	547
3	234	255	121	302
4	142	161	79	187
5	107	128	51	84
	Total Average Losses from Panels, Btu/hr			
	4182	4321	2509	3177
Ratio[a]	0.43	0.425	0.50	0.55
Ratio[b]	0.74	0.73	0.795	0.65

[a] Area of zone No. 1 / total floor area.

[b] Heat loss from zone No. 1 / total heat loss from panel.

House No. 1 was occupied by a couple, both of whom worked. They were home only in the evenings. In house No. 2 were a man and his wife and two small children. An unmarried nurse purchased house No. 3. The house was sometimes unoccupied for a week or two at a time while she was on a case. House No. 4 was occupied by a man and wife; the wife was usually at home.

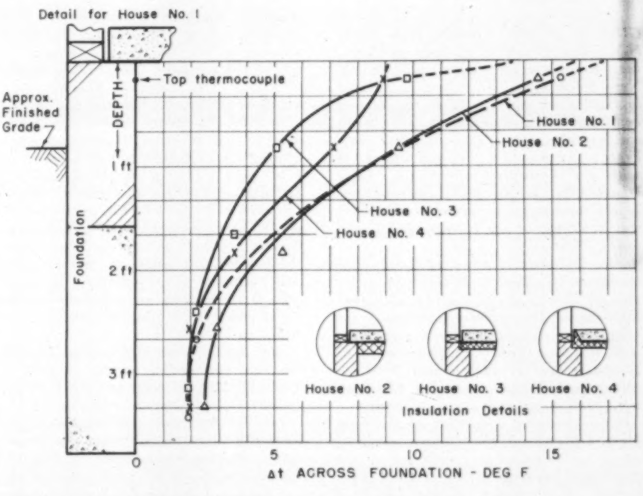

Fig. 11—Average seasonal temperature drop across foundation

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[2] Thermal Properties of Soils by Niles S. Kersten, (*Bulletin No. 28*, Engineering Experiment Station, University of Minnesota).

Floor coverings can have an appreciable effect on the downward heat loss from a heated floor slab. Carpets or rugs act as an insulation on the top of the panel and cause a greater heat flow downward. During the period in which these tests were being made, floor coverings varied, not only from house to house, but from time to time in the same house.

There were also at least two unusual factors which tended to reduce the heat losses from all houses, and to minimize the differences between the insulated and uninsulated installations. One of these was the abnormally deep (14 to 19 in.) gravel fill between the rough grade and the slab. The other was the unusually mild weather experienced last year in the Cleveland district.

Acknowledgments

The Committee on Research and the authors wish to express their appreciation to the Precision Housing Corp. for making the four houses available for test and installing the insulation and tile under the slabs, to the Pittsburgh Corning Corp. for the insulation used in houses 3 and 4, to the *Structural Clay Tile Products Association* for the tile used under the slab in house 2. and to the occupants of the four houses for their ready cooperation in making the homes accessible to members of the Laboratory staff for taking data.

Conclusions

1. The greatest part of the heat loss from a floor panel occurs around the perimeter of the panel. It is in this area that insulation will prove most effective.
2. It is particularly important that the panel be separated from the foundation by suitable insulation.
3. Four in. hollow clay tile does not appear to be any more effective as an insulation under a floor panel than an equivalent thickness of gravel. Its use as an edge insulation was not studied.

Honored by Life Membership

Gustav A. Dornheim
New York, N. Y.

GUSTAV A. DORNHEIM, New York, N.Y.—Vice President of Buensod-Stacey, Inc., was born on August 30, 1885 in New York City. He attended schools in New York and started in the heating and ventilating industry in 1903 with the Frank Dobson Co. as office boy. From 1912 to 1933 he was associated with the Thompson-Starrett Co., Long Island City, as estimator and engineer in the mechanical department. He later was in charge of the Heating and Ventilating Division.

Mr. Dornheim became affiliated with Voorhees, Gmelin & Walker in 1934, and for a time served with the Treasury Department Procurement Division. He spent three years as mechanical engineer with the New York City Department of Hospitals, and in 1939 joined Buensod-Stacey, specializing in piping for heating, ventilating and air conditioning.

Mr. Dornheim, a member of the New York Chapter of the Society, received his Life Membership Certificate at the November meeting of the Chapter. He served as a member of the board of governors of the New York Chapter in 1918-21. He is a Licensed and Registered professional engineer in the State of New York.

Byron K. Eaton
Hinsdale, Ill.

BYRON K. EATON, Hinsdale, Ill.—Heating engineer with Montgomery Ward, La Grange, was born in Omaha on November 1, 1885. He received his B.Sc. in mechanical engineering from the University of Nebraska, and following his graduation he completed a post graduate course in heating and ventilating.

Mr. Eaton spent 12 years with the American Radiator Co., joining the staff in 1908, and in 1913 he was appointed manager of the Los Angeles branch office of the company. In 1918 he moved to Kansas City where he became assistant manager of the Kansas City Branch.

In 1921 Mr. Eaton became chief engineer of the Winslow Boiler and Engineering Co., Chicago, which position he held until 1933, when he joined the Delco Heat Division of General Motors. His association with Delco, over a period of 15 years, brought him to St. Louis, Omaha and back to Chicago, and during these years his activities were varied, and included the conducting of many schools in heating and air conditioning engineering. He joined Montgomery Ward in 1948.

Mr. Eaton joined the Society in 1919, and was responsible for the chapter in THE GUIDE 1924-25 on Oil Fuel for Industrial and Domestic Heating.

In 1923 he issued a Temperature and Fuel Chart for the Chicago area graphically showing the monthly deficiencies between average temperatures and 70 deg, as compared with the actual monthly deficiencies for the 1922-23 heating season. This was one of the earliest charts and later became known as the degree-day system.

Mr. Eaton is a member of the La-Grange Lions Club in which he is serving his second year as Lions Club Tail Twister. When he joined the Society he became affiliated with the Kansas City Chapter, and during his stay in Omaha he was very active in the activities of the Nebraska Chapter and became one of its charter members. His Life Membership Certificate was presented to him at the December meeting of the Illinois Chapter, at which he was one of the honored guests.

COLL TURNER FLINT, Boston, Mass.—Branch Sales Manager for The H. B. Smith Co., Inc. for over 29 years, was born on May 22, 1885 at Woburn, Mass., where he attended school.

Before joining The H. B. Smith Co., he spent nine years with the Magee Furnace Co., Boston, in their Steam and Water Department.

Mr. Flint joined the ASHVE back in 1919, and was presented with his Certificate of Life Membership by Dean L. E. Seeley, first vice president of the Society, at the October meeting of the Massachusetts Chapter.

J. AMBLER JOHNSTON, Richmond, Va.—Partner in the firm of Carneal and Johnston, was born at Gilmores Mill, Rockbridge County, Va., on May 18, 1885. He was educated in the Public Schools and received an M.E. degree from Virginia Polytechnic Institute in 1905 and from Cornell in 1906. During his summers, while attending V.P.I. he worked as an electrician on a group of buildings for a new college.

J. Ambler Johnston
Richmond, Va.

In 1907 Mr. Johnston opened an office for the practice of consulting engineering, which led to the formation of a partnership in 1908 with a young architect. This partnership progressed for 42 years, when in 1949 the once young architect partner retired.

Mr. Johnston's work paralleled the development of the art and science of heating and ventilating from the old one-pipe steam heating plant to air conditioning today, on the road having designed ice plants, banana curing plants, tobacco drying plants, district heating and other ramifications of more than 1500 commissions, including three large colleges in Virginia, commercial and industrial work, prisons and office buildings.

He has served as director of the Bank of Commerce and Trust in Richmond since 1932, and as president of the V.P.I. Alumni Association for two years (1938-40). Besides being a member of the Society, Mr. Johnston also holds membership in the ASME, ASRE, on the Board of Trustees of Confederate Memorial Institute, Virginia Historical Society, and is a member of the Omicron Delta Kappa, Tau Beta Pi, and Phi Kappa Phi fraternities. He belongs to the Commonwealth and Rotary Clubs in Richmond.

VAN APPLEGATE REED, JR., Pittsburgh, Pa.—Secretary, Federal Engineering Co. Mr. Reed was born in Pittsburgh, Pa., December 4, 1879. He received his preparatory education at the Elizabeth, Pennsylvania School and attended Armour Institute. In 1900-04 he was in charge of heating and ventilating design in layout work for the C. H. Bradley, Jr. & Co., Pittsburgh. In 1904 he organized the Federal Engineering Co., where he was in charge of engineering in original design, installation and operation of steam, gas, water and air heating systems. He later became chief engineer.

Mr. Reed is also a Life Member of ASME, National Association of Power Engineers, Engineers Society of Western Pennsylvania and a registered professional engineer in the state of Pennsylvania.

CARL EDWARD ZIBOLD, White Plains, N. Y.—Mechanical engineer with the War Department, U. S. Army, District Engineer located in New York, was born on November 3, 1880 in Germany. He was graduated with an M.E. degree from Politechnicum, Stuttgart, Germany, and entered the United States in 1909.

He was employed by G. A. Sutter & Co., later succeeded by Child & Scott, as chief engineer on heating, ventilating and power installations, and during World War I was engaged in the same capacity at the Army Supply Base, Brooklyn, N. Y.

Carl E. Zibold
White Plains, N. Y.

In 1923 he started his own business as professional engineer and contractor and was active in this field for many years. During World War II he was appointed to a position with the First Army at Governors Island, New York, as command engineer on inspection and supervision of maintenance, repairs and combustion, etc., in Army Posts and Airfields throughout the northern part of New York State.

Mr. Zibold, in his connection with the New York District Engineer, U. S. Army, is working on Veteran Hospitals and other military constructions.

SOCIETY'S ROLE IN LEGISLATIVE MATTERS

A number of inquiries have come to Council regarding the extent to which the Society and its chapters may participate in legislative activities, the development of local codes and standards, etc. Legal Counsel was requested by the Executive Committee to prepare a statement of the Society's position.

Following is a brief review of the statutes, documents and rulings pertaining to the limitations on the power of the Society and its agencies to engage in legislative activities:

Membership Corporations Law: There is no provision in this law prohibiting membership corporations from engaging in legislative activities. Indeed, membership corporations may be formed to participate in legislative matters, provided no pecuniary profit is sought and the corporation's objectives do not contravene public policy.

The Charter: The purposes of the Society as expressed in the amended certificate of incorporation are to advance the arts and sciences of heating, ventilating, cooling and air conditioning, and the allied arts and sciences, for the benefit of the general public, to engage in scientific research and educational activities, to disseminate knowledge and information in said arts and sciences, to form Chapters and Branches, to acquire property, and to exercise powers incidental to the foregoing. Clause 4 (*e*) empowers the Society to "cooperate with governmental agencies in furtherance of the foregoing purposes".

All of the Society's powers are subject to the proviso that "this corporation shall be operated exclusively for scientific and educational purposes; no substantial part of the activities of this corporation shall be the carrying on of propaganda or otherwise influencing or intending to influence legislation".

The By-Laws: The amended By-laws are in accord with the provisions of the certificate of incorporation. No committee has been created to concern itself with legislative matters, or to seek to bring about improvements of the laws under which members execute their employment and derive economic benefits. A Standards Committee has been established to consider "scientific questions and data pertaining to engineering codes and standards, and initiate and propose changes and improvements thereof for the public benefit and report its recommendations to the Council".

The Tax Statutes: Section 101 (6) of the Internal Revenue Code confers tax free status upon "corporations *** organized and operated exclusively for *** scientific *** or educational purposes, *** and no substantial part of the activities of which is carrying on propaganda or otherwise attempting to influence legislation". Similar provisions are contained in the employment tax sections of the Internal Revenue Code, and in the estate and gift tax laws. So long as the Society meets the conditions prescribed in Section 101(6), it is exempt from payment of income taxes (except on unrelated business net income, as defined in new Section 422 (*a*) of the Code, added by the 1950 Tax Laws); the employment taxes are not applicable to it; contributions made to the Society are deductible by donors in computing their net income; gifts made to the Society are deductible for gift tax purposes; and bequests are deductible in arriving at the value of the net estate of a decedent who has bequeathed a legacy to the Society.

The Lobbying Acts: The Federal Anti-Lobbying Act requires every organization soliciting and receiving contributions or expending money to influence the passage or defeat of Congressional legislation, to keep detailed accounts of contributions, issue receipts as prescribed by statute, and file statements of account with the Clerk of the House of Representatives. All persons who receive consideration for such purposes are required to register as lobbyists with the Clerk of the House and the Secretary of the Senate. The registration provision does not apply to persons merely appearing before Congressional committees, nor does it prohibit newspapers and periodicals from publishing editorial views on legislative matters, provided that they engage in no other legislative activities except to appear before Congressional committees. The penalties for violating the Act are severe. They range from a fine of not more than $5000. and imprisonment for not more than a year, to a fine of not more than $10,000. and felony imprisonment for as much as five years.

Section 66 of the New York Legislative Law provides that every person receiving compensation to promote or oppose legislation shall, before performing any service, file with the Secretary of State a specified registration statement. The fine for violation of the Act is $1000. plus $100. for each default day in filing the registration statement. The Attorney General of the State of New York has ruled that persons appearing before legislative committees without compensation are not regarded as lobbyists and consequently not required to register.

The Precedents: The cases relating to legislative activities of scientific and educational organizations are understandably sparse, for few such organizations generally evince any substantial interest in legislative matters. The tax regulations provide that such organizations shall be "operated exclusively for one or more of the specified purposes *** and must not by any substantial part of their activities attempt to influence legislation by propaganda or otherwise". No clearer general rule than that expressed in the regulations can be derived from the cases.

In *American Birth Control League*, it was ruled that the Society was a scientific organization, but that inasmuch as its activities included efforts to enlist the support of legislators in effecting the repeal of laws thwarting the League's purposes, it was not entitled to tax exemption. Thereafter the League amended its charter by eliminating its power to engage in legislative activities, and tax exemption followed.

An Accountants Institute would be held not to be tax exempt where its activities included efforts to bring about legislative improvement of the tax statutes.

A non-partisan agency of citizens joining to promote better government, which limited its activities to publishing research reports — albeit these were frequently referred to by state and county officials — was held to be tax exempt.

ASME was accorded tax exemption, but as a prerequisite it was required to demonstrate to the satisfaction of the Bureau that the society's legislative activities were limited to the passage of resolutions favoring or disapproving proposed legislation, and to appearances upon invitation before legislative committees and administrative officials, but only in situations where it was felt that technical engineering views were desirable to assist in the formulation of legislation. The society showed that its activities included no circularizing of legislators, canvassing of members, or other attempts to bring about outside pressure for or against legislation.

It is evident from the foregoing that the Society's activities in the legislative field should be carefully circumscribed to avoid forfeiture of tax exemption and classification under the lobbying acts. Also it should be stressed that the proviso against legislative activities contained in Clause 4 (*e*) of the Charter is mandatory and there must be compliance therewith.

It is therefore recommended that the Society and its agencies — Council, officers, committees, chapters, branches, employes, and independent representatives and members when acting in behalf of the Society — conform to the following safe compendium of legislative conduct:

1. The Society and its said instrumentalities may not, by any substantial part of their activities, attempt to influence federal, state or local legislation by propaganda or otherwise. Specifically they should not:

(*a*) Make contact with legislative bodies advocating or condemning legislation, except by the express invitation of interested legislators.

(*b*) Make efforts to bring about outside pressure for or against legislative action by publications, circulars, pamphlets, petitions or otherwise, or encourage others so to do.

(*c*) Solicit, receive or expend funds, render services or devote facilities for legislative or propaganda purposes.

(*d*) Contribute sums, services or facilities to other persons, groups or organizations for the purpose of influencing legislation.

(*e*) Employ or pay any person, group or organization to influence legislation.

(*f*) Make reimbursement for expenses incurred in connection with such activities.

2. The Society and its agencies, however, may:

(*a*) Express the Society's position editorially or by resolution concerning legislation affecting the arts and sciences in which the Society, by the terms of its Charter, is legitimately interested — but the Society should not go beyond mere expression of opinion. (*For example*: The Society would have no legitimate interest in legislation respecting the welfare of engineers or their social or economic position, or in proposals to police the profession or control the conditions under which its members work, or the ethics or manner in which they execute their employment.)

(*b*) Appear before legislative bodies upon legislative invitation only, for the purpose of setting forth constructive scientific and technical views relating to proposed legislation affecting said arts and sciences.

(*c*) Cooperate with executive and administrative agencies for the purpose of promoting said arts and sciences.

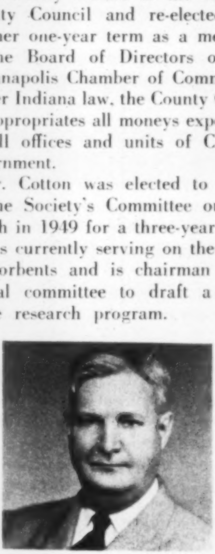
(*d*) Make its research reports and periodicals available to governmental agencies in the manner in which they are available to the public.

(*e*) Contribute to persons, groups or organizations a part of whose objects and activities may be towards influencing legislation, but such contributions should be limited to the specific purposes authorized by the Society's Charter, and the Society should see to it that its contributions are utilized for the purposes specified.

I. W. COTTON ELECTED TO MARION COUNTY COUNCIL

I. W. Cotton, president, The I. W. Cotton Co., Indianapolis, Ind., was recently elected to the Marion County Council and re-elected for another one-year term as a member of the Board of Directors of the Indianapolis Chamber of Commerce. Under Indiana law, the County Council appropriates all moneys expended by all offices and units of County government.

Mr. Cotton was elected to serve on the Society's Committee on Research in 1949 for a three-year term and is currently serving on the TAC on Sorbents and is chairman of a special committee to draft a long range research program.



I. W. Cotton
Indianapolis, Ind.

Your Hosts in Philadelphia

M. F. Blankin
Honorary Chairman

A. J. Nesbitt
General Chairman

F. H. Buzzard
Vice Chairman

Isadore Director

John Everetts, Jr.

E. K. Wagner

M. E. Barnard

E. H. Dafter

C. F. Dietz

1951 Annual Meeting

Committee on Arrangements

A. J. Nesbitt, *General Chairman*

M. F. Blankin, *Honorary Chairman*

F. H. Buzzard, *Vice Chairman*

Banquet—M. E. Barnard, Chairman; H. R. James, E. C. Lambert, C. J. Lubking, W. W. Malloy, H. H. Mather, G. W. Powell, Jr., G. E. Tuckerman, F. B. Wilder.

Entertainment—E. K. Wagner, Chairman; R. H. Ackermann, R. J. Augusterter, H. H. Erickson, H. J. Faltenbacher, H. W. Goldner, J. H. Hucker, R. F. Hunger, L. P. Hynes, M. G. Kershaw, R. S. Mizener, S. R. Nusbaum, F. F. Pfeiffer, A. M. Robertson, Karl Rugart, Edward Semel, R. J. Sigel, J. K. Walters.

Exposition—C. F. Dietz, Chairman; C. G. Binder, H. W. Doerrfuss, C. J. Forve, Nicola Ginzburg, A. A. Granke, H. E. Grossman, J. E. Heim, J. J. Hucker, Jr., H. K. King, A. E. Kriebel, H. H. Mohrfeld, A. G. Mutimer, H. M. Parent, R. M. Sharp, G. F. Smith, W. D. Strause, H. N. Teuber.

Finance—A. C. Caldwell, Chairman; C. B. Eastman, Edwin Elliot, R. J. Lee, L. E. Moody.

Ladies—E. H. Dafter, Chairman; G. F. Bertrand, R. H. Smiles. Assisted by:—Mmes. R. S. L. Arnold, M. E. Barnard, G. F. Bertrand, M. F. Blankin, F. H. Buzzard, L. M. Church, W. P. Culbert, E. H. Dafter, C. F. Dietz, John Everetts, Jr., H. B. Hedges, J. H. Hucker, R. F. Hunger, M. G. Kershaw, J. O. Kirkbride, C. S. Leopold, Ludwig Mack, H. H. Mather, J. W. McElgin, L. E. Moody, A. J. Nesbitt, E. K. Wagner.

Publicity—W. P. Culbert, Chairman; G. P. Alexander, A. E. D'Ambly, S. E. Plewes, R. D. Touton.

Reception—J. O. Kirkbride, Chairman; L. M. Church, Co Chairman; R. S. L. Arnold, T. J. Atkins, Lucien Buck, P. A. Cavanagh, S. E. Farrington, H. E. Gross, H. B. Hedges, A. H. Koch, James Marshall, H. G. McCullough, F. B. Millham, H. B. Prewitt, J. J. Quinn, R. P. Schoenijahn, W. S. Scott, C. D. Shields, Pierce Timmis, L. A. Tucker.

Sessions—John Everetts, Jr., Chairman; Alan Dombro, R. E. Sexton, M. A. Sheffler.

Transportation—Isadore Director, Chairman; E. J. Curley, F. N. Darby, L. C. Davidson, J. E. Hutchison, Ludwig Mack, P. H. Yeomans.

W. P. Culbert

J. O. Kirkbride

L. M. Church

A. C. Caldwell

SUMMARY OF CHAPTER MEETINGS*

• *BALTIMORE*—November 15, 1950. The business meeting which was preceded by dinner at 6:30 p.m. at the Engineers Club, was called to order by Pres. G. B. Priester. A number of business items were discussed including the raising of the dinner costs, the announcement of the Engineers Club Boat Trip, and retaining Chapter members called into the Service on the Chapter rolls dues free. In the election of the Baltimore Chapter's member and alternate member on the Society's Chapters Conference Committee, President Priester was elected member and E. L. Crosby, past president of the Chapter, alternate member.

J. E. Seiter introduced the speaker of the evening, Eugene D. Milener, coordinator of utilization research, American Gas Association, New York, N. Y. Mr. Milener's subject covered the history of natural gas, including the development, resources, fields, pipelines, distribution, venting, ignition and combustion phases in the use of gas as a source of energy. After an interesting discussion period, the meeting was adjourned. Attendance 37. Attendance ratio 0.40.

• *CINCINNATI*—November 7, 1950. Pres. E. W. McNamee called the meeting to order in the Engineering Society headquarters and the minutes of the October 3 meeting were read and approved. Announcements were made by F. B. DeBra concerning the arrangements being made for the Chapter's Annual Christmas Party to be held on December 21 in Newport, Ky. Mr. DeBra announced that the committee for nominations of a member to the Award Committee of the Technical and Scientific Council had filed its report with the Award Committee. K. B. Little stated that a meeting of the Council would be held on November 9, at which time the Award winner would be elected.

The speaker of the evening, Ernest Szekely, Second Vice President of the Society and president of Bayley Blower Co., Milwaukee, Wis., was introduced by Pinkney Varble. Mr. Szekely's topic was *Fans — Their Design and Application* and he treated those in attendance to a glimpse of his vast knowledge gained over years of experience in the fan manufacturing business. At the conclusion of the talk, Mr. Szekely was extended a rising vote of thanks, after which the meeting was adjourned. Attendance 45. Attendance ratio 0.40.

• *CONNECTICUT*—October 26, 1950. The meeting was held in the Waverly Inn, Cheshire, Conn., with Pres. D. M. Hummel presiding. The minutes of the previous meeting and the treasurer's report were read and approved. L. W. Shepard reported that a large number of membership application blanks had been distributed and that he felt that at the next Chapter meeting there would be a group of new members to be proposed.

President Hummel then introduced the speaker of the evening, Henry Sleik, vice president of W. B. Connor Engineering Corp. His subject was *The Methods of Elimination and Control of Odors in Air Conditioning and Ventilating Systems,* which was well delivered and demonstrated by a sample system which he had set up and which created a great deal of interest. Following Mr. Sleik's talk the meeting was adjourned. Attendance 44. Attendance ratio 0.19.

• *GOLDEN GATE*—November 2, 1950. The meeting was called to order in the Engineer's Club, San Francisco, Calif., by Pres. K. F. Baldwin, Jr. Following the roll call of members and the introduction of guests, the minutes of the October 5, meeting were read and approved. President Baldwin announced the forthcoming Annual Meeting, which is to be held in Philadelphia, Pa. in January, and the Semi-Annual Meeting, which is to be held in Portland, Ore. in July, commenting that he hoped that the Golden Gate Chapter members would participate actively in the numerous activities of the forthcoming Semi-Annual Meeting.

D. C. Wiley of the *NACA* Laboratory at Moffett Field was introduced and gave an interesting talk on *Development in High Speed Air Craft,* followed by the presentation of a color motion picture of the activities at the Ames Laboratory at Moffett Field. Attendance 71.

• *INLAND EMPIRE*—November 10, 1950. Pres. W. C. Vradenburg called the meeting to order in the Stone Room of the Spokane Hotel and the minutes of the previous meeting were read and approved as read. After the treasurer's report and a report on the board of governors meeting was given, the President called for reports from the meetings, membership, attendance and publicity committees.

L. E. Marque introduced the guest speaker for the evening, S. D. Peterson, branch manager, Johnson Service Co., Seattle, Washington. Mr. Peterson's talk was on *Automatic Controls for Heating and Ventilating.* The meeting adjourned at 10:15 p.m. Attendance 25. Attendance ratio 0.45.

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*Note: The attendance ratios shown represent the membership attendance divided by the chapter membership. These ratios will be useful as a partial indication of interest shown by local chapter members in various types of subjects programmed by the various chapters and may be useful in deciding on subjects for chapter meetings.

• *INLAND EMPIRE*—October 6, 1950. The meeting was called to order at 7:30 p.m. in the Spokane Hotel and the reading of the minutes of the previous meeting was waived until the next meeting. A. J. Hess, Los Angeles, Calif., member of the Society's Chapter Relations Committee and the Committee on Research, was introduced to the members. Following a report by the treasurer, L. E. Marque introduced the speaker for the evening, Carl F. Boester, housing consultant, Purdue Research Foundation, Purdue University, Lafayette, Ind., who spoke on *New Practices in High Temperature Forced Hot Water Heating*. Mr. Boester's talk covered for the most part design problems in connection with use of high temperature water. Attendance 31.

• *IOWA*—October 10, 1950. After the dinner which was held at 6:30 p.m. in the Des Moines Golf and Country Club, Pres. R. S. Stover called the meeting to order and introduced Irving Behrens, Brown Engineering Co. and president of the *Iowa Engineering Society*. Mr. Behrens spoke on *Engineering in Iowa* and stressed the importance of encouraging young engineers in the profession and then outlined the reasons for organizing engineering societies as follows: (1) that it is a matter of good business to meet and talk over the problems of the profession (2) that the social aspect encourages closer cooperation (3) that through a society the latest technical data are imparted to all and (4) the inspiration and encouragement which is gained through such an organization is of great value to the engineer.

He touched briefly on the ethics of the profession and the welfare of its members and pointed out the decrease in new engineers graduating from colleges and universities since the last war. He stated that for every professional engineer working in the engineering profession there are three assistants in the field. At the conclusion of his talk, Mr. Behrens extended an invitation to the members to participate in the *Iowa Engineering Society's* Annual Meeting in February 1951.

A sound film on the choosing of engineering as a profession was shown to the members through the courtesy of the Allis-Chalmers Mfg. Co. Attendance 18.

• *KANSAS CITY*—November 6, 1950. Pres. W. E. Howarth called the meeting to order in the Roof Garden of the Aladdin Hotel and the minutes of the October 2 meeting were read and approved. J. G. Barnes, Jr., chairman of the attendance committee, requested that members cooperate with the telephone committee for dinner reservations by making a definite commitment so that an exact number of reservations could be made. Reports were made by J. H. Traynor, chairman of the membership committee and F. K. Ladewig, chairman of the newsletter committee. President Howarth explained the details concerning transportation facilities to Philadelphia, Pa. for the 57th Annual Meeting of the Society.

C. W. Schumacher, program chairman, introduced Art Scott, of Howarth, Scott, and Kinney, mechanical engineers, Kansas City, Mo., who acted as moderator for the night. A panel discussion on the subject *Maintenance and Operation of Large Heating, Ventilating and Air Conditioning Systems* was conducted and the following made up the panel: C. S. Graves, E. H. Rossback, Henry Schmall, and F. C. Wilson. The members enjoyed the discussion which centered around the merits of the various types of filters, removal of odors, and types of cooling towers.

Following the panel discussion, a sound, color movie entitled *Come to Portland, Oregon, for the City of Roses Meeting Next July*, was shown through the courtesy of the Oregon Chapter of the Society in promoting attendance at the Society's forthcoming Semi-Annual Meeting in Portland, July 1951. Attendance 57. Attendance ratio 0.25.

• *MEMPHIS*—October 16, 1950. The meeting, which was preceded by dinner, was called to order in the King Cotton Hotel at 6:30 p.m. by Pres. C. S. Fischer. After the reading and approval of the minutes of the previous meeting, President Fischer introduced and welcomed the guests. A motion was made and seconded that the Memphis Chapter would accept the film, being shown through the courtesy of the Oregon Chapter in various chapters throughout the country, for presentation at the Memphis Chapter's February meeting. President Fischer then announced the arrangements made for the Chapter's November meeting.

The meeting was then turned over to R. E. Larkin, chairman of the meetings committee, who introduced L. C. McClanahan, district manager, Aerofin Corp., Cleveland, Ohio. Mr. McClanahan spoke on *Blast Coils and Their Application*, and at the conclusion of his talk President Fischer expressed appreciation for his interesting presentation. Attendance 26.

• *MICHIGAN*—November 13, 1950. The meeting was called to order at the Engineering Society of Detroit by Pres. C. F. Donohoe and the minutes of the previous meeting were approved as read. The report of the membership committee, given by the chairman, D. S. Falk, indicated that approximately 16 new members had already been accepted into the Michigan Chapter since the beginning of this season. G. W. Akers, chairman of the program committee, reported on the December meeting, which is to be a joint meeting with the *ASME* and *ASRE*.

Mr. Akers then introduced the speaker of the evening, E. R. Queer, professor of engineering research, The Pennsylvania State College, State College, Pa., who spoke on *Moisture Control in Materials and in the Atmosphere*. Professor Queer presented a very interesting talk supplemented by many slides covering his experiences while working with the United States Navy directly after World War II in connection with dehumidifying the atmosphere inside the vessels of the Mothball Fleet. The outstanding success of this particular program has since been proved by the fact that many of these vessels have been put back into almost immediate operation since the outbreak of the Korean War, stated Professor Queer. He also presented a thorough outline of the research being conducted by The Pennsylvania State College on vapor barriers in connection with domestic housing. The lively discussion period which followed indicated a great interest in the subject. The meeting adjourned with a rising vote of thanks to Professor Queer. Attendance 85.

• *MINNESOTA*—November 6, 1950. Pres. G. M. Kendrick officially opened the meeting at 7:50 p.m. in the Robin Hood Room of the Dyckman Hotel, Minneapolis and introduced the guests present at the meeting. The minutes of the October meeting were read and approved and President Kendrick reported that J. A. Holbrook had been appointed as a member and representative of the Minnesota Chapter on the local Civilian Defense Committee. Nominations for a member and alternate member to represent the Minnesota Chapter on the Chapters Conference Committee were called for and it was moved and seconded that President Kendrick and E. F. Snyder, vice president of the Chapter, be elected member and alternate member, respectively. Prof. F. B. Rowley was then introduced and presented a Life Membership Certificate to D. M. Forfar.

V. D. Wissmiller introduced the speaker of the evening, C. G. Newton, chief engineer, Kritzer Radiant Coils Co., Chicago, Ill. Mr. Newton gave an excellent talk on *Baseboard Heating*, which was followed by an extended question and answer period. Attendance 110. Attendance ratio 0.38.

• *MONTREAL*—October 17, 1950. The meeting, which was held at the Berkeley Hotel, was called to order by Pres. R. R. Noyes at 6:30 p.m. and the minutes of the May meeting were read and approved as read. One minute of silence was observed in remembrance of Messrs. Watt and Baker, who died recently.

F. A. Hamlet introduced the speaker of the evening, Lester T. Avery, president of the Society and president of Avery Engineering Co., Cleveland, Ohio, who spoke briefly on Society affairs. Following intermission, Mr. Avery gave a talk on *Dynamic Air Conditioning*. In discussing the importance of air and its relationship to man, he stated that while air is, in general, taken for granted, studies on air are being conducted by scientists in various fields. Using slides, Mr. Avery stressed the importance of air in providing a healthful environment for man for living and working. S. W. Salter thanked Mr. Avery on behalf of the Chapter for his excellent presentation. Attendance 60.

• *NEW YORK*—November 20, 1950. The social hour, which began at 6:00 p.m., was followed by dinner at the Building Trades Club, New York City. Pres. C. F. Kayan called the business meeting to order at 8:00 p.m. and the minutes of the October 16 meeting were read and approved. President Kayan then introduced Ernest Szekely, second vice president of the Society and president of Bayley Blower Co., Milwaukee, Wis., and Reg F. Taylor, treasurer of the Society and consulting engineer from Houston, Tex. A. J. Offner, past president of the Society, was present and was recognized by President Kayan. Mr. Szekely presented a Life Membership Certificate to J. J. Walterthum and it was announced that G. A. Dornheim, who was unable to remain at the meeting, would receive his Life Membership Certificate later.

President Kayan then introduced G. B. Priester, air conditioning engineer, Consolidated Gas, Electric Light & Power Co., Baltimore, Md., who spoke on the subject, *Sales Trends and Troubles in Air Conditioning*. Mr. Priester's talk was divided into two principal parts, the first covering collected data on air conditioning installations in the Baltimore area for the period 1946-1948. From these data, tables had been prepared showing such items as number of installations, horsepower, distribution of installations by size, number of installations made by months of the year for various sizes, number of room cooler sales, power consumption data, and checked figures for estimation of air conditioning loads. The second part of the talk was devoted to a discussion of troubles experienced with air conditioning installations and the methods which had been used to correct the difficulties. Following the talk there was a discussion period, and the meeting was concluded with a rising vote of thanks to Mr. Priester. Attendance 120.

• *NORTH CAROLINA*—October 27, 1950. Following dinner and a social hour, Pres. M. F. DuChateau called the business meeting to order and welcomed Prof. C. A. McKeeman and eleven members of the North Carolina State College Student Branch. President DuChateau called for reports from G. B. Rottman, the secretary and J. E. Hart, program chairman, concerning the proposed chapter activities for the balance of the year. Further discussion was also held concerning the North Carolina Chapter's invitation to hold a Semi-Annual Meeting of the Society in North Carolina in the near future, and President DuChateau read the response from A. V. Hutchinson, executive secretary of the Society, to the Chapter's letter of invitation. The following members were elected to serve on the nominating committee: G. B. Rottman, J. E. Hart, F. J. Reed, C. A. McKeeman, and R. M. Warren, Jr.

Mr. Hart then introduced Russ Gray, district manager, Carrier Corp., who gave a talk on *Skyscraper Air Conditioning*. Mr. Gray was assisted by M. Wilson, also of Carrier Corp., and the talk was very well received and was followed by a lengthy discussion period. Attendance 53. Attendance ratio 0.33.

• *NORTH TEXAS*—October 16, 1950. Pres. Herman Blum called the meeting to order in the Melrose Hotel at 8:00 p.m. and members and guests introduced themselves. The minutes of the September meeting were read and approved. There was a discussion concerning the proposed amendment to the chapter bylaws, changing the inauguration of officers from December to February and it was suggested that ballots be counted in December to allow the president time to select his committee for the following year. The proposed amendment was outvoted and the inauguration of officers will take place in December as usual.

L. S. Gilbert, owner, Gilbert Engineering Co., Dallas, was the speaker of the evening and presented a very interesting program on the subject of heating. At the end of his talk, Mr. Gilbert said he was like the little boy who sat on the cake of ice—"my tale is told." Attendance 70. Attendance ratio 0.33.

• *NORTHEASTERN OKLAHOMA*—November 14, 1950. Members and guests met at Smith's Restaurant at 6:30 p.m. for dinner, and the business meeting which followed was called to order by Pres. A. D. Holmes. The roll was called and the secretary read the minutes of the previous meeting, which were approved as read. Guests were introduced by their member hosts and the report of the nominating committee was read.

C. H. Dollmeyer, Jr. introduced the guest speaker of the evening, Raymond Mancha, vice president, ventilation equipment, Joy Manufacturing Co., Pittsburgh, Pa., who presented a sound movie and an interesting talk on the subject, *Vaneaxial Fans*. The talk was followed by a general discussion period, after which the meeting was adjourned. Attendance 21. Attendance ratio 0.41.

• *NORTHERN OHIO*—November 13, 1950. Preceding the opening of the business meeting, the Northern Ohio Chapter was addressed by Had Easton, president of the Rocky River Kiwanis Club, who spoke on the subject *How to Beat Socialism in the U.S.A.* Mr. Easton's talk was well presented and interesting to his audience. Pres. W. M. Rowe called the meeting to order at 8:20 p.m. in the Warner Auditorium and the minutes of the previous meeting were read and approved. R. L. Byers, past president of the chapter, was then called on to summarize the meeting of the Society's Council held in October at the Society's Research Laboratory. The Northern Ohio Chapter officers and board of governors were guests at the Council meeting. Mr. Byers reported that the meeting had a full attendance, some Council members having come from Texas, California, Colorado, Oregon and Washington. Mr. Byers then briefly reviewed some of the projects going on at the Laboratory, including the studies on air distribution and the calorimeter room for the panel heating program. J. N. Sampson, chairman of the membership committee, announced that the December meeting was the *Bring a Member Meeting*. He pointed out that the attendance in terms of ratio of members to guests was poor and asked that each member present take it upon himself to invite and bring another member who had not been attending regularly.

L. C. Burkes, program chairman, introduced the speaker, P. R. Achenbach, past president of the Washington, D.C. Chapter, and assistant chief, Heating & Air Conditioning Section, *National Bureau of Standards*, Washington, D.C. Mr. Achenbach presented in excellent fashion the results of studies on warm air heating of basementless houses carried on by the *National Bureau of Standards*. He stated that this work had been done at the request of the *FHA* in order to evaluate the performance of inexpensive warm-air heating installations. Performance of the various systems was compared on the basis of temperature distribution. After a lengthy discussion period the meeting adjourned. Attendance 41. Attendance ratio 0.21.

• *OKLAHOMA*—October 9, 1950. Pres. R. E. Swan called the meeting to order at 8:00 p.m. in Beverly's Drive-In, Oklahoma City, Okla. The speaker of the evening F. W. Rabe, southwest representative, Lilie-Hoffman Cooling Towers, Inc., spoke on *Cooling Towers*, discussing mainly the application and testing of cooling towers. The meeting adjourned at 9:30 p.m. Attendance 45. Attendance ratio 0.58.

• *PACIFIC NORTHWEST*—October 10, 1950. Following dinner at the Engineers Club, the meeting was called to order by Pres. C. A. Pangborn. Following the introduction of attending guests, R. M. Stern, vice president and program chairman of the chapter, introduced the speakers of the evening, N. H. Gellert, Jr., superintendent of distribution and utilization, and C. M. Sturkey, vice president and general manager, both of the Seattle Gas Co. Mr. Gellert spoke on sizing, combustion air, venting, piping, and other problems which are part of the everyday business of the gas company. Mr. Sturkey made an interesting presentation of the facts as they now stand relative to the proposed gas line from Canada to Texas. The question and answer period which followed substantiated the keen interest of the audience. Attendance 39.

• *PHILADELPHIA*—October 12, 1950. The meeting was called to order by President McElgin at 7:50 p.m. at the Engineers Club and the minutes of the previous meeting were read and approved. Life Membership Certificates were presented to H. P. Gant, A. E. Kriebel, S. E. Plewes and E. R. Sabin.

The speaker of the evening, O. C. Lewis, district engineer, Layne New York Co., Inc., New York, N. Y., was introduced. Mr. Lewis spoke on *Ground Water Conditions in the United States*. The talk was followed by a very interesting Kodachrome moving picture with sound. Attendance 100. Attendance ratio 0.39.

JOURNAL SECTION

• *PITTSBURGH*—November 13, 1950. Members and guests met at the Fort Pitt Hotel for dinner, and Pres. A. F. Metzger called the business meeting to order at 7:40 p.m. and called for the reading of the minutes of the October 13 meeting, which were approved as read. W. D. Simpson, program chairman, reported on the meeting for December stating that the speaker would be from the Joy Manufacturing Co. President Metzger then read the list of the newly elected chairmen and members of the various committees. It was announced that two chapter members would be speakers at the *ASME* Conference, which is to be held on April 19-20, 1951. The speakers will be T. F. Rockwell, who will speak on *Greater Pittsburgh Airport* and B. R. Small, who will speak on *Heating and Cooling Panels.* Mr. Simpson then introduced the speaker of the evening, A. G. H. Dietz, associate professor of structural engineering, Massachusetts Institute of Technology. Cambridge. Professor Dietz spoke on *Solar Heating for Houses* and showed many slides on the subject, explaining at the same time the ways and means and also the possibility of heating the homes. He also stated that it is necessary to have standby heat (about 16 percent) for days when there is not enough sunlight to generate heat. In his slides, he showed the different ways and means of transferring heat, both with water and air.

Following the talk, a question and answer period was conducted. Attendance 40.

• *SOUTHERN CALIFORNIA*—November 15, 1950. Members and guests enjoyed dinner at the Conde French Restaurant, and the business meeting was called to order at 8:30 p.m. Pres. L. J. Helms called for nominations for the Southern California Chapter members to serve on the Chapters Conference Committee. Mr. Helms and M. C. Greiner, vice president of the Chapter, were nominated as member and alternate member, respectively, and a unanimous ballot was cast electing them to the committee.

The speaker of the evening was Warren Viessman, manager, Heating and Ventilation Branch, Research and Evaluation Laboratory, Construction Battalion Center, Port Hueneme, Calif. Mr. Viessman's subject was *Personnel Shelters in Modern Warfare with Particular Emphasis on Air Cleaning.* He related the various problems with regard to the protection of air and ventilation requirements in these shelters both from poisonous gases and from bacterial warfare and used a number of slides to illustrate some of the research and the experimental mechanisms that have been used by this facility in touching the various solutions to these problems. In addition to this, he showed motion pictures covering the experimental field of activity, illustrating the actual mechanisms of a shelter setup for the experimental purposes and some of the physiological experiments on personnel. Comparisons were made between devices developed at this laboratory for the purpose of isolating or decontaminating the various destructive impurities which might be introduced into ventilation air streams with similar devices of commercial construction and usage. Mr. Viessman's talk was well received and brought forth a number of questions which indicated a great deal of interest. Attendance 75. Attendance ratio 0.37.

• *SOUTHERN CALIFORNIA*—October 18, 1950. President Helms called the meeting to order at the Conde French Restaurant, Beverly Hills and the reading of the minutes was dispensed with. A. J. Hess introduced the speaker, J. Donald Kroeker, member of Council and consulting engineer of Portland, Ore. Mr. Kroeker preceded his talk by extending greetings from the Oregon Chapter and by reviewing some of the preparations being made for the Semi-Annual Meeting to be held in Portland in July 1951.

Mr. Kroeker began his talk by presenting a review of the design conditions and also some operating results obtained after a year or more operation of two large commercial heat pump installations in Portland, one in the Oregonian Building and the other in the Equitable Building. Mr. Kroeker presented some of the comparisons between operating results and design predictions which in every case indicated that operating results exceeded by some margin the design predictions. The presentation was illustrated with slides giving photographic views of the structures and some of the internal machine rooms as well as the performance curves of the systems overall. At the end of the talk, a discussion period was held in which many questions were asked, indicating that the audience was interested in the material presented. Attendance 84. Attendance ratio 0.46.

• *SOUTHWEST TEXAS*—October 17, 1950. Members and guests met in the Tapestry Room of the St. Anthony Hotel, San Antonio, and Pres. L. S. Pawkett called the meeting to order at 9:00 p.m. The minutes of the previous meeting were read and approved as read and I. W. Wilkie reported that the speaker at the next meeting would be Lester T. Avery, president of the Society and president of Avery Engineering Co., Cleveland, Ohio. W. E. Long reported that the dates of the sixth Southwest Air Conditioning Conference, to be held at the University of Texas, had been changed.

Boone Crisp introduced the speaker, M. G. Haynes of the Sporlan Valve Co., who gave a very interesting and informative talk on thermal expansion valves. Mr. Haynes's talk was well illustrated with slides and dealt with the basis of design, the construction, and the operation of thermostatic expansion valves. The talk was followed by a discussion period. Attendance 21. Attendance ratio 0.31.

• *UTAH*—November 8, 1950. Pres. R. E. East called the meeting to order at 7:30 p.m. in the Doll House and

President Avery standing with Past President Giesecke and Southwest Texas Chapter officers at Dinner meeting in San Antonio

called for the reading of the minutes of the April 12 and October 5 meetings, which were approved as read. Since there were very few members present it was decided to turn the meeting into a general discussion period in an endeavor to find means of stimulating interest in and attendance at the meetings. It was decided that the chaper should have more speakers from the local group with the thought that the discussion of local jobs and problems would be of more interest to the members. The possibility of preparing a new roster with member's pictures and more descriptive information was discussed. The membership committee, along with the secretary, was instructed to act as a group and investigate the cost and feasibility of such a roster. It was further decided that all speakers, including member speakers, should have their dinners paid by the Chapter. Attendance 9.

• *UTAH*—October 5, 1950. The meeting was held in the Newhouse Hotel and President East presided and conducted the meeting. Carl F. Boester, housing consultant, Purdue Research Foudation, Purdue University, Lafayette, Ind., was the speaker of the evening. In his preliminary remarks, Mr. Boester suggested that some of the chapter members serve on technical advisory committees and encouraged the members to take an interest in research work for the benefit of the Society and themselves, as well. The subject of Mr. Boester's talk was *Central Heating with* 450 *Degree Hot Water*, and covered the economics effected in the use of high temperature forced hot water for district heating and the potential earnings of such a system, also design and application problems, particularly as related to pipe sizes, pipe velocities and the head required for the system.

Following Mr. Boester's talk, the secretary was instructed to send a letter to all members inviting them to attend an annual meeting, sponsored by the Utah Engineering Council. Attendance 35.

• *WASHINGTON, D.C.*—November 8, 1950. Pres. F. M. Thuney called the meeting to order at Naylor's Seafood Restaurant and the reading of the minutes of the previous meeting was dispensed with. President Thuney once again commended J. L. Manheim, chairman of the attendance committee, for the turnout of members and guests. It was announced that A. E. Beitzell had been appointed a member of the new Permanent Refrigeration and Air Conditioning Committee of the District of Columbia. S. R. Allen, meeting chairman, reported that the speaker of the next meeting would be G. B. Priester, Baltimore, Md. who would speak on *Trends and Troubles in Air Conditioning*. He also called attention to the joint meeting with the *ASRE* in Baltimore, Md., January 17 and urged the members to attend.

Following a few more announcements, the meeting was turned over to Mr. Allen, who introduced Carl F. Boester, housing consultant, Purdue Research Foundation, Purdue University, Lafayette, Ind. Before beginning his talk, Mr. Boester pointed out that active participation in the ASHVE was enjoyable and wondered how many members were aware of the research projects going on at the Society's Research Laboratory in Cleveland. Mr. Boester also questioned whether the majority of members actually benefited by the funds invested in research or whether it would be best to abandon all efforts in that direction. Mr. Boester urged that members *think* about these things.

Mr. Boester began his talk on *New Practices in Warm Air and Hot Water Heating* by stating that commercial and industrial applications of high temperature hot water heating to large housing projects and buildings were almost mandatory on account of the rising costs of construction. He stated that there was very little literature on this subject and after touring most of this country and abroad in search of high temperature hot water installations, came to the conclusion that lack of interest in this phase of heating was due to an unfounded belief that there are inherent dangers in the use of high temperature hot water heating, whereas he found that this system was equally as safe as an ordinary hot water system.

He spoke of the great superiority he found in American equipment over foreign countries he visited. He related an amusing experience where he came across a metal expansion valve that was superior to anything he had ever seen in America and wanted to bring back this discovery to the United States. Investigating the source of this valve, he discovered it was manufactured in the middle West of the "good old U.S.A."

He maintained that nothing is really new about high temperature hot water heating since this system has been in operation for many years, and the principal fittings not much different from those used for steam. Mr. Boester stated that any type boiler suitable for steam is suitable for high temperature hot water work. The talk was followed by a question and answer period. Attendance 86. Attendance ratio 0.47.

• *WESTERN NEW YORK*—November 6, 1950. Following the opening of the business meeting, members introduced themselves and their guests. The minutes of the October meeting were read and approved. Pres. J. H. Bryce announced that Joseph Davis and Roswell Farnham had been appointed the Western New York Chapter's member and alternate member, respectively, on the Society's Chapters Conference Committee. Mr. Davis was then called on to present the past president's certificate to F. J. Weber, retiring president of the Chapter. The speaker of the evening, D. L. Mills, manager, Pipe and Tube Section, Research Department, Revere Copper & Brass Co., Rome, N. Y., was introduced. Mr. Mills' talk was on *Radiant Heating in Theory and Practice* and covered many items related to the design, installation and operation of panel heating jobs. Mr. Mills used figures and a number of slides to show how knowledge of radiant heating has increased in the past years and gave the basic figures used in design. He pointed out the limitations of this type of system and gave many useful suggestions on installation of coils and related supply and return lines. Mr. Mills answered many questions asked by the members and everyone agreed that the subject and the presentation was very interesting. At the conclusion of the meeting a rising vote of thanks was extended to Mr. Mills and the other representatives of the Revere Copper & Brass Co. and to the W. A. Case Co. for a very educational and interesting evening. Attendance 85.

• *WISCONSIN*—October 27, 1950. The October meeting was a joint meeting with the *Engineers Society of Milwaukee*. A social hour and dinner was held at the Engineers Society Building and a talk was given by Paul Dietz, export manager, Allis-Chalmers Manufacturing Co., on his recent European business trip.

The combined meeting was held in the auditorium of the Wisconsin Electric Power Co., and was opened by R. H. Earle, president of the *Engineers Society of Milwaukee*. Mr. Earle introduced F. J. Nunlist, president of the ASHVE Wisconsin Chapter, who welcomed the members and guests. H. F. Brinen, vice president and program chairman of the Wisconsin Chapter was introduced and discussed the November meeting, followed by the introduction of A. D. Robertson, program chairman of the *ESM*, who discussed the November meeting of the *ESM*.

The guest speaker of the evening was A. G. H. Dietz, associate professor of structural engineering, Massachusetts Institute of Technology, Cambridge, who spoke on *Solar Heating for Houses*. Prof. Dietz stated that the gradual depletion of fossilized fuels will necessitate the more efficient use of natural forms of energy and the greater utilization of renewable forms of energy. The magnitude of solar energy is such that two square miles per day is equivalent to the energy of one atomic bomb. He stated that research on the utilization of solar energy has been in progress since 1879 and for 15 years at M.I.T.

Professor Dietz discussed the construction of the M.I.T. Solar House, construction and orientation of the solar energy collector, the control system as well as the means of storing energy when the sun was not visible. Further discussion centered on weather data affecting solar energy absorption, materials other than water for energy storage, economic factors and the use of south facing windows for direct absorption of solar energy in the living space. Mention was made of the use of solar energy for cooling in summer and heating in winter. Attendance 156.

ALBANY ASHVE MEMBERS HOLD MEETINGS

A group of Society members in and around Albany, N. Y., have held preliminary meetings to explore the possibilities of establishing a chapter and have submitted an application to Council for such an organization.

At a meeting held on September 19, R. B. Taylor acted as temporary president. He introduced the other temporary officers, N. W. Burrill and D. A. Carofana and then announced the guests of the evening, A. V. Hutchinson, executive secretary of the Society, New York, N. Y., and Carl F. Boester, housing consultant at the Purdue Research Foundation, Purdue University, Lafayette, Ind.

Mr. Boester, after mentioning the multiple avenues of approach to many problems in applied engineering and the difficulty of determining the most desirable subjects for research, progressed to his main topic, *New Practices in High Temperature*

Forced Hot Water Heating, which he has studied extensively in this country, as well as briefly in Europe. Mr. Boester's talk was well received, and after many questions were asked, the meeting was adjourned.

The group met again on November 14, and C. D. Cross acted as chairman and introduced the guest speaker, D. L. Mills, research and development engineer, Revere Copper & Brass, Inc., Rome, N. Y. After a few introductory remarks on the advantages of chapter membership, Mr. Mills addressed the group on *Radiant Heating in Theory and Practice*. Mr. Mills brought out points of particular interest, explaining that the basic theory of radiant heating is the same regardless of the method of heating generation (air, water, or electricity). In concluding his remarks he stated that radiant heating is not the answer to all problems, and that compromises may be necessary, as in the case of supplemental unit heaters. If suitable conditions for radiant heating cannot be provided, he emphasized that some other system should be employed.

Mr. Mills showed many slides demonstrating radiant heating practice, and at the conclusion of his talk responded to many questions asked from the floor. From the discussion which followed it was evident that Mr. Mills' talk was also well received.

The organizing committee is pleased with the interest indicated in the preliminary meetings and hopes that a charter for a chapter will be authorized.

C. A. BOOTH HONORED AT 50TH ANNIVERSARY

C. A. Booth, vice president of Buffalo Forge Co., Buffalo, N. Y., and Life Member of ASHVE, was honored at a formal dinner at the Buffalo Club, November 13, by the officers and directors of the company in commemoration of his Fiftieth Anniversary with the company.

Mr. Booth, a native of Massachusetts, attended Worcester Polytechnic Institute, where he was active on the track team, at hurdling and at football. Upon graduation in 1899, he taught at Williston Seminary, East Hampden, Mass., for a year, joining Buffalo Forge Co. in 1900. His main interests with the company were engineering and sales. In the early part of the century, there was very little information available on air moving, and air conditioning was a new science sponsored largely under Mr. Booth's direction.

Deeply interested in elevating the engineering standards of the industry, Mr. Booth was active in the organization of the National Association of Fan Manufacturers, and was several times an officer of that Association.

He was elected vice president of the company in 1920, is credited by President Edgar F. Wendt for having been responsible to a large extent for the company's growth in the ventilating and air conditioning fields.

At the dinner, which was attended by department managers and out-of-town representatives and Mr. Booth's son, Theodore, vice president of the Walworth Co., a testimonial scroll signed by the group was presented.

Edgar F. Wendt, president of Buffalo Forge Co., presents scroll to C. A. Booth at testimonial dinner, while Henry W. Wendt, chairman of the board, looks on

B. H. JENNINGS RECEIVES OUTSTANDING AWARD

Burgess H. Jennings, professor of mechanical engineering and department chairman, Northwestern University, Evanston, Ill. and member of the Society's Guide Committee during 1947, 1948 and 1950, was awarded the 1950 Richards Memorial Award for outstanding achievement in mechanical engineering at the annual dinner of the *ASME* held in the Grand Ballroom of the Hotel Statler, New York, November 29, 1950.

This award, established in 1944, endowed by Pi Tau Sigma, national honorary mechanical engineering fraternity, is presented *for outstanding achievement in mechanical engineering within* 20 *to* 25 *years after graduation* from a regular four-year mechanical engineering course of a recognized American college or university.

Professor Jennings was born in Baltimore, Md., and after his graduation from the Johns Hopkins University in 1925, he was employed by the Consolidated Gas Electric Light & Power Co., of Baltimore. He left there to attend Lehigh University, where he obtained his M.S. and M.A. degrees and continued on the teaching staff at Lehigh for 14 years. He was consulting engineer, directing refrigeration research for the Philadelphia & Reading Coal and Iron Co., Pottsville, Pa. from 1934-38, and from 1943-45 was consultant for the Frigidaire Division, General Motors Corp. He also served as research investigator on control of cross infection by use of glycol vapors, U.S. Office of Scientific Research and Development, and has been engaged in general research and writing relative to refrigeration, air conditioning and power production since 1930.

Among the books written by Professor Jennings are: *Steam and Gas Engineering* (with T. E. Butterfield and A. W. Luce) in 1933; *Air Conditioning and Refrigeration* (with S. R. Lewis) in 1938; *Internal Combustion Engines, Analysis and Practice* (with E. F. Obert) in 1944; and *Handbook of Toxic Gases* (with J. F. Bailey) in 1945.

Professor Jennings is also a member of the *ASME* Chicago Section, *ASRE, American Public Health Association, Society for Promotion of Engineering Education*, and of the Pi Tau Sigma, Tau Beta Pi, Sigma Xi, and Pi Mu Epsilon fraternities. He is a member of the University Club of Evanston. Professor Jennings is listed in *Who's Who in America* and *Who's Who in Engineering*.

SOLID FUELS ADMINISTRATOR NAMED

Secretary of the Interior Oscar L. Chapman has announced the appointment of Edward T. Klett of Wilkes-Barre, Pa., as deputy administrator of the Defense Solid Fuels Administration. The new deputy will be in charge of matters pertaining to the production and distribution of anthracite.

Mr. Klett has had extensive experience in the anthracite industry since 1920 in New York City and Pennsylvania. He was secretary and director of the Haddock Mining Co. and affiliated companies from 1920 to 1950 and since September 1950, he has been Washington representative of the *Anthracite Institute*.

Candidates for Membership

The Society's By-Laws require that all applications for membership or advancement are to be sent to the Executive Secretary and the names of applicants and their references shall be printed in the next issue of the Journal of the Society, or mailed to all members. When the replies are received from references the Candidate's application shall be submitted to and acted upon by the Admission and Advancement Committee as soon as possible.

When the Admission and Advancement Committee has acted favorably upon a Candidate's application and assigned his grade, the Council shall confirm the election of the proposed Candidate for membership. During the past month 119 applications for membership, including 45 student applications, 2 reinstatements; and 10 advancements have been received and the names of these men and their sponsors are published in the following list.

Members are requested to scrutinize the list with care. The Admission and Advancement Committee, and in turn, the Council, urge members to assume their share of responsibility of receiving these candidates into membership by advising the Executive Secretary promptly of any whose eligibility for membership is in any way questioned.

All correspondence in regard to such matters is strictly confidential, and is solely for the good of the Society, which it is the duty of every member to promote.

Unless objection is made by some member by January 30, 1951, these candidates will be voted upon by the Council. Those elected to membership will be notified by the Executive Secretary immediately after election.

Aguilar, M. R., Mech. Designer, Garthorne, Buonaccorsi & Murray, San Francisco, Calif. References: E. F. Dill, J. E. Murray, J. B. Smith, T. J. White.

Alvey, R. J., Engrg. Trainee, Robert E. Hattis, Chicago, Ill. References: B. S. Hattis, R. E. Hattis, B. H. Spurlock, Jr., Michael Stearn*.

Angel, R. H., Supt. Spokane Office, Johnson Service Co., Spokane, Wash. References: O. E. Bowers, R. J. Harris, L. E. Marque, W. C. Vradenburg.

Bell, J. R., Jr., Dist. Mgr., Industries Sales Corp., Lafayette, Ind. References: C. V. Bankston, L. V. Busenlener, R. B. Guest, E. O. Thoman.

Bishop, R. E., Sales Repr., American Radiator & Standard Sanitary Corp., Minneapolis, Minn. References: A. J. Huch, G. M. Kendrick, E. A. Monies, V. E. Pearson.

Bousquet, Rodolph, Treas. & Mgr., Woonsocket Consumers Coal Co., Inc., Woonsocket, R. I., References: G. D. Frank, J. B. Landry, H. L. Mohn, C. H. Neiman.

Brettler, B. J., Research Asst., M. I. T., Dept. of Economics, Cambridge, Mass. References: James Holt, Joseph Kaye*, W. M. Rohsenow*, G. B. Wilkes.

Carr, L. D., Secy. Don E. Hawk Associates, Inc., New York, N. Y. References: Albert Giannini, P. B. Gordon, J. E. Schechter, A. L. Croohe.

Chamberlain, H. O., Pres.—Gen. Mgr., Chamberlain Heat Engrg. Corp., Detroit, Mich. References: A. V. Cauhorn, D. S. Falk, H. P. Osgood, H. W. Snyder.

Chapin, T. G., Lab. Tech., Tuttle & Bailey, Inc., New Britain, Conn. References: W. L. Batchelor, J. H. Smart, R. D. Tutt, Leonard Zavorski.

Christy, J. W., Engr., L. E. Stevens & Co., Cincinnati, Ohio. References: J. J. Bechtol, William Harlow*, Frank Kurry*, J. E. Oetjen*.

Cobb, G. S., Regn'l. Mgr., Chrysler Airtemp Sales Corp., Dallas, Tex. References: J. C. Baker, W. H. Luedecke, R. R. Matthews, W. L. Snodgrass.

Dale, L. V., Sales Engr., Westinghouse Electric Corp., Sturtevant Div., Seattle, Wash. References: Marius Anderson, T. C. Caskey, R. O. Granston, J. D. Sparks.

Daniels, L. D., Sales Engr., Curtiss Insulating Co., Spokane, Wash. References: O. E. Bowers, J. A. Doyle, R. J. Harris, T. P. Nau.

Defasselle, R. J., Field Engr., Bryant Heater Div., Affiliated Gas Equipment, Inc., Cleveland, Ohio. References: K. T. Davis, J. L. Frisse, H. W. Heisterkamp, W. R. Teller.

Dudkin, O. N., Asst. Engr., United Engineers & Constructors Inc., Philadelphia, Pa. References: Leonard Peller, F. F. Pfeiffer, G. W. Powell, Jr., Pierce Timmis.

English, Robson, President, English and Lauer, Inc., Los Angeles, Calif. References: I. C. Jennings, J. F. Park, N. H. Peterson, R. N. Trane.

Farr, J. S., Sales Engr., Lennox Furnace Co., Decatur, Ga. References: C. B. Acker, S. R. Hirsch*, Graham Magee*, W. M. Simpson*.

Fink, J. M., President, J. M. Fink Co., Inc., New York, N. Y. References: B. B. Howes, C. S. Koehler, E. A. Kaplun, A. U. Zimmerman*.

Forseille, R. R., Sales Engr., Baltimore Aircoil Co., Inc., Baltimore, Md. References: John Engalitcheff, Jr., W. P. Flanigan, G. J. Senner, R. F. Weisman.

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*Non-Member

Francis, A. P., Mgr., Crane Co., Wichita, Kans. References: D. M. Allen, R. F. Bauer, O. G. Bullock, L. H. Johnson, Jr.

Freidenrich, R. S., Estimator, P. S. Lord Co., Portland, Ore. References: J. D. Kroeker, O. T. Jacobson, J. P. McDermott, W. A. Simpson.

Freidrich, H. E., Sales Engr., Johnson & Norman, New York, N. Y. References: R. F. Farnham, W. R. Heath, H. S. Johnson, G. C. Norman.

Gage, E. H., Air Cond. Engr., International Harvester Co., Chicago, Ill. References: R. W. Crysler, E. E. Sundeen, J. F. Tobin, G. V. Zintel.

Gloss, H. M., Jr., Project Engr., Office of Hollis French, Boston, Mass. References: R. F. Carter*, R. B. Stevens, K. E. Stockman*, F. A. Merrill.

Griffin, J. P., President, J. P. Griffin, Inc., Tampa, Fla. References: F. M. Cooper*, J. W. Gray*, J. A. Griffin*, E. C. Schoen.

Griffiths, R. H., Sales Trainee, The Trane Co., St. Paul, Minn. References: J. V. Borry, J. G. Hamm, Leo Krisl, William McNamara.

Hainline, W. E., Estimator, Backman Sheet Metal Works, Des Moines, Ia. References: T. R. Johnson, C. H. McGuiness, E. H. Pietsch, B. A. Schwirtz.

Hymen, H. M., Mech. Engr., A. Epstein and Sons, Inc., Chicago, Ill. References: William Goodman, Raymond Epstein*, H. L. Nachman, A. J. Sander.

Jerger, E. W., Asst. Prof., Iowa State College, Ames, Ia. References: H. M. Black*, E. D. Hay*, L. A. Landeroth, Jr., J. F. Sandfort.

Jones, C. R., Jr., Heating & Air Conditioning Engr., Patchen & Zimmerman, Augusta, Ga. References: J. J. Evans*, M. W. Jones*, S. M. Watson*, H. F. Zimmerman.*

Judd, J. H., Sales Engr., Johnson & Norman, Sales Engrs., Newark, N. J. References: W. R. Heath, H. S. Johnson, G. C. Norman, R. P. Warren.

Kishler, M. L., Sales Engr., American Radiator & Standard Sanitary Corp., Boston, Mass. References: R. S. Franklin, L. R. Geissenhainer, A. L. Hare, D. C. Miller.

Lambert, Charles, Sales Engr., Johnson Service, Co., San Francisco, Calif. References: F. W. Hook, L. A. Meade, J. E. Murray, J. B. Smith.

Lang, R. W., Jr., Sales Engr., Reichle Supply Co., Saginaw, Mich. References: L. A. Burch, R. L. Deppmann, W. A. Leesch, Jr., F. X. Marzolf.

LeBlanc, W. J., Designing Engr., Ogden & Woodruff, Baton Rouge, La. References: C. W. Lane, A. J. Mayers, Jr., B. M. Payne, C. S. Woodruff.

Lieber, J. M., Mgr. Heating Dept., State Plumbing & Heating Supplies, Detroit, Mich. References: C. H. Baker, J. P. Band, J. W. Kozakar, H. P. Osgood.

Lord, G. D., Sales Engr., Hess, Greiner & Polland, Los Angeles, Calif. References: M. C. Greiner, A. J. Hess, Fritz Honerkamp, Stanley Pollard*.

Malani, R. D., Dir., Blue Star Engineering Co., Bombay, India. References: M. L. Benson*, L. P. Hanson, R. A. Nelson, A. J. Rochey*.

McGhee, J. C., Staff Engr., Washington Gas Light Co., Washington, D. C. References: G. W. Huff, J. L. Manhein, L. B. Nye, Jr., L. Ourusoff.

Miller, L. F., Sales Engr., Brod & McClung, Portland, Ore. References: Dick Blankenship, E. E. Kelly, E. R. Lokey, T. H. McClung.

Nevers, R. D., Sales Engr., Heating Assurance Inc., Spokane, Wash. References: O. E. Bowers, L. E. Marque, T. P. Nau, W. C. Vradenburg.

Niemoller, A. L., Designer, Warren, Little & Lund, Spokane, Wash. References: O. E. Bowers, J. L. Harvey, R. J. Harris, T. P. Nau.

Ogden, H. N., Partner, Ogden and Woodruff, Baton Rouge, La. References: J. S. Adair, C. W. Lane, R. S. Oyer, C. S. Woodruff.

Ormsby, E. M., Sales Engr., Bryant Whitesell Co., Minneapolis, Minn. References: R. T. Haley, V. E. Pearson, C. P. Petersen, R. M. Stewart.

Oswald, G. L., Sales Engr., Johnson Service Co., Kansas City, Mo. References: Carl Clegg, O. W. Kinney, F. A. Sheppard, J. H. Traynor.

Paller, Ben, President, Paller Engineering Co., Indianapolis, Ind. References: I. W. Cotton, P. R. Harris, R. F. James, R. C. Simpson.

Pfost, J. F., Mech. Engr., Ellerbe & Co., St. Paul, Minn. References: A. B. Algren, R. C. Bosworth, William Sturm, C. C. Wells.

Pentecost, R. W., Gen. Sales Mgr., Baltimore Aircoil Co., Inc., Baltimore, Md. References: E. L. Crosby, W. P. Flanigan, A. K. Kroft, E. H. Taze.

Pisharody, K. R., Mgr., British Refrigerators, Calcutta, India. References: J. M. Brown, M. Manivelu, P. M. Menon*, S. R. Sarkar.

Pomerantz, Herbert, Jr. Engr., S. J. O'Brien Sales Corp., New York, N. Y. References: Stanley Dicker, A. Mayerbach*, G. London*, Ralph Torop.

Reinbach, Bernard, Treas., Andrew Roofing Corp., New York, N. Y. References: A. A. Kurtis, Bernard Leventhal, J. L. Page, C. W. Stewart.

Rich, C. E., Sales Engr., J. C. Pressly & Co., St. Petersburg, Fla. References: R. J. Clark, Trice Bell*, Guy Hall*, J. C. Pressly*.

Robbins, G. W., Sales Trainee, The Trane Co., St. Paul, Minn. References: A. B. Algren, J. V. Borry, J. G. Hamm, William McNamara.

Ruggiero, C. P., President, New Comfort Appliance Co., Inc., Staten Island, N. Y. References: John Bulyk, C. S. Koehler, Sherman Loud, Daniel Santors*.

Sackett, D. M., Designer, C. F. Braun & Co., Alhambra, Calif. References: H. M. Herrick, E. O. Howard, H. E. Maguire, F. M. Patterson.

Sander, D. E., Sales Engr. American Radiator & Standard Sanitary Corp., Dallas, Tex. References: Herman Blum, Jr., G. A. Linskie, J. A. Ray, P. N. Vinther.

Schellhase, M. R., Inspector, Porter & Bradley, Laramie, Wyo. References: E. J. Lindahl, H. T. Person*, F. H. Porter*, R. E. Shipp*.

Schmidt, J. H., Manufacturer's Repr., San Francisco, Calif. References: G. C. Barnaby*, T. B. Gillianin*, F. H. Meyers*, T. A. Marshall.

Scott, W. T., Heating Supt., Ashwell-Twist Co., Seattle, Wash. References: R. L. Langdon, D. O. Mead, C. A. Pangborn, C. L. Vinsonhaler.

Shanks, R. E., Mgr., Industrial Instrument Supply, Spokane, Wash. References: O. E. Bowers, J. A. Doyle, R. J. Harris, T. P. Nau.

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OBITUARIES

ARTHUR L. HENZE
W. Lafayette, Ind.

The Society has been informed of the death of Arthur L. Henze on November 14 in St. Elizabeth Hospital, Lafayette, after an illness of four months.

Mr. Henze was born on October 5, 1895 at Elwood and attended Purdue University taking an electrical engineering course. From 1920-1932 he was employed with Charles Wheeler Nicol, architect, as superintendent on new buildings and designer of mechanical equipment. For a period of approximately 15 years Mr. Henze was associated with Walter Scholer and Associates, architectural firm, as a mechanical engineer. During the war years, he was a mechanical engineer in the Department of Physical Plant at Purdue University, and at the time of his death, Mr. Henze was employed with Walter Scholer and Associates.

He was a member of the *International Association of Electrical Inspection*, the West Lafayette Masonic Lodge No. 724 and Elks Lodge 143.

Mr. Henze is survived by his widow, Mrs. Mabel Henze, to whom the Officers and Council of the Society extend their sincere sympathy.

ALFRED G. WAHLBERG
Duluth, Minn.

Word has been received of the death of Alfred G. Wahlberg, in September, at the age of 61. Mr. Wahlberg was born on March 23, 1889 in Sweden and attended Lewis Institute, Chicago, graduating with a B.S. in mechanical engineering.

Mr. Wahlberg's first association was with Western Electric Co., Chicago, Ill., after which he was employed by Swenson Engineering Co. of Chicago. In 1937 Mr. Wahlberg opened his own office as a consulting engineer in Duluth. At the time of his death he was a consulting engineer.

Mr. Wahlberg was a member of the Duluth Engineers Club and a registered engineer in the state of Minnesota.

The Officers and Council of The American Society of Heating and Ventilating Engineers extend their sincere sympathy to the members of Mr. Wahlberg's family.

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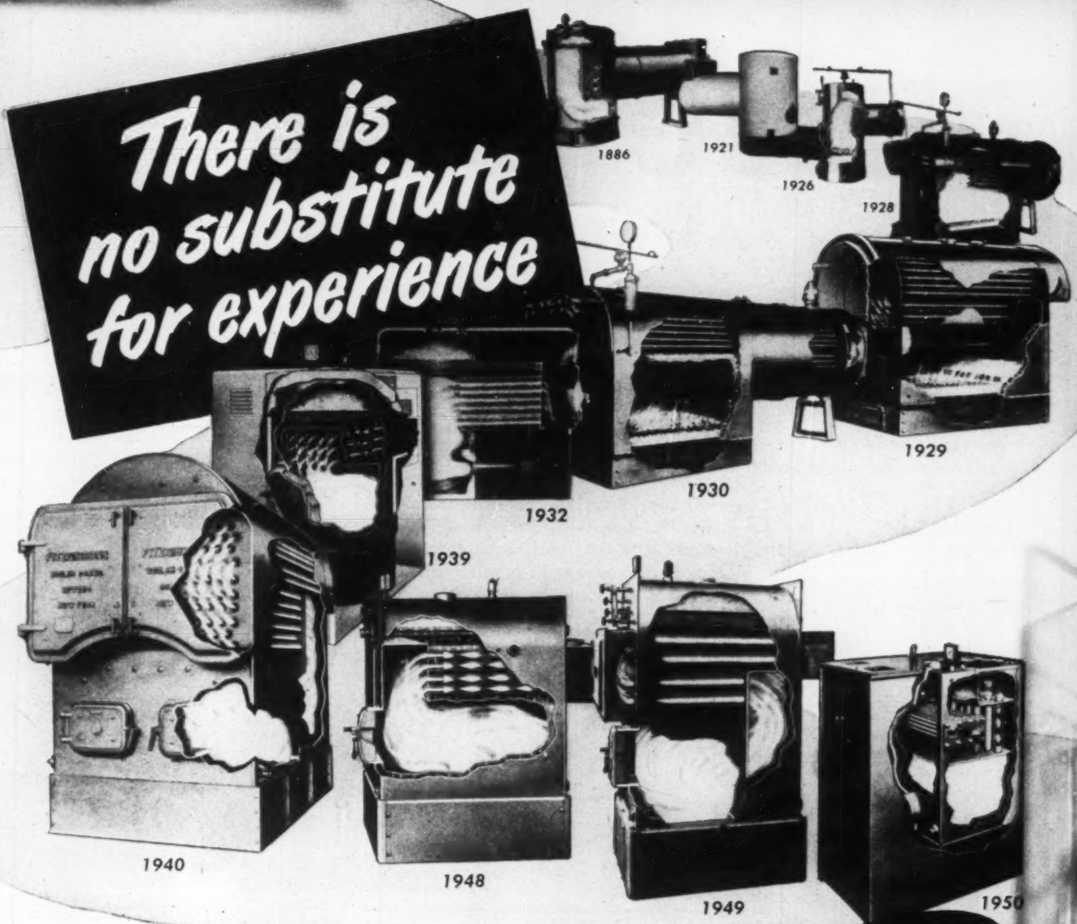
- **MANITOBA**: Organized 1935. Headquarters, Winnipeg, Man., Canada. Meets, Third Thursday. PRESIDENT, C. M. Fleming, 116 Osborne St., Winnipeg, Man. SECRETARY, W. J. Atkinson, 812 Boyd Bldg., Winnipeg.
- **MASSACHUSETTS**: Organized 1912. Headquarters, Boston, Mass. Meets, Third Tuesday. PRESIDENT, D. W. Blair, 87 Withington Rd., Newtonville 60. SECRETARY, W. A. Williams, 10 Sevinor Rd., Marblehead.
- **MEMPHIS**: Organized 1944. Headquarters, Memphis, Tenn. Meets, Third Monday. PRESIDENT, C. S. Fischer, 367 Adams Ave., Memphis. SECRETARY, A. T. Bevil, 1521 Waverly Ave., Memphis 6.
- **MIAMI VALLEY**: Organized 1950. Headquarters, Dayton, Ohio. PRESIDENT, R. J. Perkins, 621 Third Bldg., Dayton 2. SECRETARY, W. R. Budde, 305 Leo St., Dayton 4.
- **MICHIGAN**: Organized 1916. Headquarters, Detroit, Mich. Meets, First Monday after 10th of month. PRESIDENT, C. F. Donohoe, 2000 Second Ave., Detroit 26. SECRETARY, R. H. Oberschulte, 316 McKerchey Bldg., Detroit 1.
- **MINNESOTA**: Organized 1918. Headquarters, Minneapolis, Minn. Meets, First Monday. PRESIDENT, G. M. Kendrick, 402 Essex Bldg., Minneapolis 2. SECRETARY, J. V. Borry, 6433 Second Ave., Minneapolis 19.
- **MONTREAL**: Organized 1936. Headquarters, Montreal, Que., Canada. Meets, Third Monday. PRESIDENT, R. R. Noyes, Rm. 674, Sun Life Bldg., Montreal. SECRETARY, T. G. Anglin, 540 Prince Albert Ave., Montreal 6.
- **NEBRASKA**: Organized 1940. Headquarters, Omaha, Neb. Meets, Second Tuesday. PRESIDENT, G. W. Colburn, 2865 Ida St., Omaha. SECRETARY, S. W. Black, 18th and Harney Sts., Omaha.
- **NEW YORK**: Organized 1911. Headquarters, New York, N. Y. Meets, Third Monday. PRESIDENT, Carl F. Kayan, Columbia University, Morningside Hgts., New York 27. SECRETARY, Carl H. Flink, Room 3000, 51 Madison Ave., New York 10.
- **NORTH CAROLINA**: Organized 1939. Headquarters, Durham, N. C. Meets, Quarterly. PRESIDENT, R. O. McGary, P.O. Box 1755, Charlotte. SECRETARY, J. A. Rice, 718 E. Worthington Ave., Charlotte.
- **NORTH TEXAS**: Organized 1938. Headquarters, Dallas, Tex. Meets, Third Monday. PRESIDENT, Herman Blum, 2812 Fairmount, Dallas 4. SECRETARY, R. E. Allison, 607-11 First Ave., Dallas 10.
- **NORTHEASTERN OKLAHOMA**: Organized 1948. Headquarters, Tulsa, Okla. PRESIDENT, A. D. Holmes, 323 W. First St., Tulsa. SECRETARY, J. N. Watt, 528 E. Fifth St., Tulsa.
- **NORTHERN OHIO**: Organized 1916. Headquarters, Cleveland, Ohio. Meets, Second Monday. PRESIDENT, W. M. Rowe, 1302 Swetland Bldg., Cleveland 15. SECRETARY, G. V. Parmelee, 94 Solon Rd., Chagrin Falls.
- **OKLAHOMA**: Organized 1935. Headquarters, Oklahoma City, Okla. Meets, Second Monday. PRESIDENT, R. E. Swan, 2 N. W. Sixth St., Oklahoma City. SECRETARY, W. J. Collins, Jr., 2240 Oklahoma Natural Gas Bldg., Oklahoma City.
- **ONTARIO**: Organized 1922. Headquarters, Toronto, Ont., Canada. Meets, First Monday. PRESIDENT, J. H. Fox, Vanderhoof Ave., Leaside, Toronto 17. SECRETARY, H. R. Roth, 57 Bloor St., W., Toronto, Ont.
- **OREGON**: Organized 1939. Headquarters, Portland, Ore. Meets, Thursday after First Tuesday. PRESIDENT, R. C. Chewning, 402 Failing Bldg., Portland 4. SECRETARY, Dick Blankenship, 725 Cascade Bldg., Portland 4.
- **PACIFIC NORTHWEST**: Organized 1928. Headquarters, Seattle, Wash. Meets, Second Tuesday. PRESIDENT, C. A. Pangborn, 312 2nd and Cherry Bldg., Seattle 4. SECRETARY, W. B. Pride, 3111 Dose Terrace, Seattle 44.
- **PHILADELPHIA**: Organized 1916. Headquarters, Philadelphia, Pa. Meets, Second Thursday. PRESIDENT, J. W. McElgin, 1926 Lycoming Ave., Overlook Hills, Willow Grove. SECRETARY, L. M. Church, 12 S. 12th St., Philadelphia 7.
- **PITTSBURGH**: Organized 1919. Headquarters, Pittsburgh, Pa. Meets, Second Monday. PRESIDENT, A. F. Metzger, 435 Sixth Ave., Pittsburgh 22. SECRETARY, E. H. Riesmeyer, Jr., 231-33 Water St., Pittsburgh 22.
- **ROCKY MOUNTAIN**: Organized 1944. Headquarters, Denver, Colo. Meets, First Wednesday. PRESIDENT, R. W. Petersen, 2115 S. Gilpin St., Denver 10. SECRETARY, P. C. Von Rosenberg, 1875 S. Cook St., Denver.
- **ST. LOUIS**: Organized 1918. Headquarters, St. Louis, Mo. Meets, First Tuesday. PRESIDENT, J. S. Rosebrough, 25 Rosemont Ave., Webster Groves 19. SECRETARY, L. L. Hamig, 1706 Olive St., St. Louis 3.
- **SHREVEPORT**: Organized 1948. Headquarters, Shreveport, La. Meets, Third Thursday. PRESIDENT, S. W. Beaty, P.O. Box 1734, Shreveport 4, La. SECRETARY, W. S. Evans, 617 Ardis Bldg., Shreveport.
- **SOUTH TEXAS**: Organized 1938. Headquarters, Houston, Tex. Meets, Third Friday. PRESIDENT, H. W. Broadwell, 2201 Texas Ave., Houston. SECRETARY, C. L. Fleming, 805-A, M & M Bldg., Houston.
- **SOUTHERN CALIFORNIA**: Organized 1930. Headquarters, Los Angeles, Calif. Meets, Third Wednesday. PRESIDENT, L. J. Helms, 3357 Fairmount Ave., La Crescenta, Calif. SECRETARY, J. S. Earhart, 2734 Fleur Dr., San Marino 9, Calif.
- **SOUTHWEST TEXAS**: Organized 1946. Headquarters, San Antonio, Tex. Meets, Third Tuesday. PRESIDENT, L. S. Pawkett, 816 Insurance Bldg., San Antonio 5. SECRETARY, W. E. Long, Mechanical Engineering Dept., University of Texas, Austin.
- **UTAH**: Organized 1944. Headquarters, Salt Lake City, Utah. Meets, First Wednesday. PRESIDENT, R. H. East, 1086 E. 21st St., Salt Lake City. SECRETARY, D. R. Wilde, 204 Dooly Bldg., Salt Lake City 1.
- **VIRGINIA**: Organized 1946. Headquarters, Norfolk, Va. Meets Third Wednesday. PRESIDENT, W. P. Robinson, 1442 Ocean View Ave., Norfolk 3. SECRETARY, D. E. Phillips, P.O. Box 674, Newport News.
- **WASHINGTON, D. C.**: Organized 1935. Headquarters, Washington, D. C. Meets, Second Wednesday. PRESIDENT, F. M. Thuney, 1919 K St., N. W., Washington 6. SECRETARY, I. M. Bortman, 422 Luray Pl., N. W., Washington 10.
- **WESTERN MICHIGAN**: Organized 1931. Headquarters, Grand Rapids, Mich. Meets, Second Monday. PRESIDENT, K. E. Robinson, 211 Smith Ave., Lansing 10, SECRETARY, F. W. Brundage, 512 N. Park St., Kalamazoo 11.
- **WESTERN NEW YORK**: Organized 1919. Headquarters, Buffalo, N. Y. Meets, Second Monday. PRESIDENT, J. H. Bryce, 120 W. Tupper St., Buffalo. SECRETARY, C. W. Stone, 503 Franklin St., Buffalo 2.
- **WISCONSIN**: Organized 1922. Headquarters, Milwaukee, Wis. Meets, Third Monday. PRESIDENT, F. J. Nunlist, Jr., 2005 W. Oklahoma Ave., Milwaukee 7. SECRETARY, N. E. Hill, 122 N. Hartwell Ave., Waukesha, Wis.

Student Branches

- **COLLEGE OF CITY OF NEW YORK**: Organized 1949. Headquarters, New York, N. Y. PRESIDENT, Seymour Weinberg, 2147 72nd Street, Brooklyn 4. SECRETARY, Benjamin Karp, 524 Berriman St., Brooklyn 8.
- **LOUISIANA POLYTECHNIC INSTITUTE**: Organized 1949. Headquarters, Ruston, La. PRESIDENT, H. A. Parker, Box 359, Tech Station, Ruston, La. SECRETARY, E. L. Lentz, Box 443, Tech Station, Ruston.
- **NORTH CAROLINA STATE COLLEGE**: Organized 1948. Headquarters, Raleigh, N. C. PRESIDENT, L. R. Wensil, 409 N. Church St., Concord. SECRETARY, V. V. Crews, 29 "D" St., Westhaven.
- **OKLAHOMA A. & M. COLLEGE**: Organized 1950. Headquarters, Stillwater, Okla. PRESIDENT, W. E. Suchan, Jr., Oklahoma A & M College, Stillwater. SECRETARY, W. D. Jenkins, 801 W. Walnut, Enid.
- **OREGON STATE COLLEGE**: Organized 1949. Headquarters, Corvallis, Ore. Meets, First Wednesday after First Tuesday. PRESIDENT, M. B. Larson, 2311 N. E. Hancock, Portland 12. SECRETARY, Helen P. Lankow, 1349 S. E. Birch St., Portland 14.
- **PURDUE UNIVERSITY**: Organized 1948. Headquarters, W. Lafayette, Ind. CHAIRMAN, John Harrell, 325 S. Chauncey, W. Lafayette, Ind. SECRETARY, Miss June Cox, 403 Maple, W. Lafayette, Ind.
- **TEXAS A. & M. COLLEGE**: Organized 1946. Headquarters, College Station, Tex. Meets, Second and Fourth Tuesday. PRESIDENT, J. O. Kadel, Box 4054, College Station, Tex. SECRETARY, W. C. Haggard, Box 5227, College Station.
- **UNIVERSITY OF DETROIT**: Organized 1949. Headquarters, Detroit, Mich. Meets, First Tuesday. PRESIDENT, L. M. Blanchette, 2245 Holcomb, Detroit 14. SECRETARY, S. H. Kosinski, 4439-30th, Detroit 10.
- **UNIVERSITY OF KANSAS**: Organized 1949. Headquarters, Lawrence, Kans. PRESIDENT, J. L. Williams, 5278 Central, Kansas City, Mo. SECRETARY, R. C. Umholtz, 2732 Michigan St., Topeka, Kans.
- **UNIVERSITY OF TEXAS**: Organized 1949. Headquarters, Austin, Tex. Meets, First and Third Tuesday. PRESIDENT, L. E. Scott, 1221-D Brackenridge Apts., Austin. SECRETARY, E. F. Luker, 1536-A Brackenridge Apts., Austin.



ACCREDITED SOURCES indicate that only about 2% of our Manufacturing Corporations have been in business continuously for 65 years. Fitzgibbons is proud to be among those select few.

The experience gained by our sixty-five years in building quality steel boilers is your assurance of top design, top construction, top performance.

The story of how Fitzgibbons has maintained its position and enhanced its reputation during sixty-five years of changing conditions and fuels, is of interest to all boiler users. We invite you to read this story in a new booklet, entitled "Straight Ahead Since 1886." A complimentary copy will be mailed you on request.

Visit our booth at the A. S. H. & V. E. Show, January 22-26, Philadelphia, Pa.

65th Anniversary

MOST ECONOMICAL IN FUEL
1886
THE FITZGIBBONS BOILER

1886-1951

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GENERAL OFFICES: 101 PARK AVENUE, NEW YORK 17, N. Y.
BRANCHES AND REPRESENTATIVES IN PRINCIPAL CITIES
Manufactured at OSWEGO, N. Y.

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DRAVO HEATERS..

AS WELL AS MONEY....FUEL...

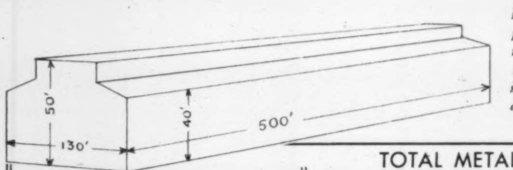
Heating system steel needs *can* be slashed from 50% to 70% for the representative open-space industrial structure shown below . . . by using the direct-fired warm air heating method with Dravo "Counterflo" Heaters! This conservation, of vital importance today, adds another to the long list of economies in money, fuel and labor effected by this heating method.

The chart below gives the detailed comparative story. Every system is equivalent in Btu output. Steel requirements for the 13 methods have been carefully and conservatively calculated.

It will be noted that Dravo Heaters not only take LESS steel in each fuel classification . . . but that the HIGHEST steel requirement in a Dravo installation is almost 50% less than the LOWEST steel requirement in any other system. Of special significance is the contrast in *pipe* required. Jobs now held up by slow pipe deliveries can MOVE... if Dravo Heaters are used!

Any time that YOUR jobs are delayed or deferred because of steel or pipe shortages, why not find out how Dravo "Counterflo" Heaters are expediting things for other users? And remember — steel savings are just *one* of the reasons that more and more Dravo "Counterflo" Heaters are heating increasing numbers and types of structures. You'll find many other good reasons listed at right, that will appeal to you.

DRAVO
DRAVO



Each heating system compared below was sized to make up a calculated 12,000,000 Btu heat loss in this representative industrial building.

TOTAL METAL REQUIREMENTS FOR VARIOUS HEATING SYSTEMS

	GAS FIRED					OIL	
COMPONENT	**DRAVO WARM AIR**	**HIGH PRESSURE CONVENTIONAL WATER TUBE BOILER**	**HIGH PRESSURE PACKAGED STEAM GENERATOR**	**LOW PRESSURE CONVENTIONAL WATER TUBE BOILER**	**LOW PRESSURE PACKAGED STEAM GENERATOR**	**DRAVO WARM AIR**	**HIGH PRESSURE CONVENTIONAL WATER TUBE BOILER**
BASIC HEAT GENERATORS	26,400	38,000	62,000	38,000	62,000	26,400	38,000
PIPING—Oil—Steam Boiler Room—Gas	9,096	15,490	15,490	35,308	35,308	4,352	15,790
TANKS—Oil—Blow-off Condensate		3,500	1,500	1,500	1,500	13,000	16,500
UNIT HEATERS including Traps & Starters		21,240	21,240	21,240	21,240		21,240
STACKS & BREECHING	1,200	4,000	400	4,000	400	1,200	4,000
PUMPS—Fuel Oil Auxiliary Oil—Boiler Feed		1,000	1,000	1,000	1,000	400	1,400
STOKERS & FANS— including Dust Collectors Fuel Oil Preheaters							2,000
STRUCTURAL STEEL Boiler House Foundation Reinforcing		7,000	2,000	7,000			7,000
TONS of STEEL REQUIRED	DRAVO 18	45	52	54	61	DRAVO 23	53

.. "CONSERVE STEEL"

. AND MAN HOURS

DISTRIBUTION PIPING AND DIFFUSERS COMPLETELY ELIMINATED

LEAST STEEL PER 1,000,000 BTU OUTPUT

NO VALVES, TRAPS OR FITTINGS

STAINLESS STEEL CHAMBER ELIMINATES REPLACEMENT

DRAVO CORPORATION

HEATING DEPT., DRAVO BUILDING, PITTSBURGH 22, PA.
Sales Representatives in Principal Cities.
Mfd. and Sold in Canada by Marine Industries, Ltd., Sorel, Quebec.

WITH IDENTICAL 12,000,000 Btu LOAD

FIRED ———→			←— COAL FIRED ←—		
HIGH PRESSURE PACKAGED STEAM GENERATOR	LOW PRESSURE CONVENTIONAL WATER TUBE BOILER	LOW PRESSURE PACKAGED STEAM GENERATOR	DRAVO WARM AIR	HIGH PRESSURE CONVENTIONAL WATER TUBE BOILER	LOW PRESSURE CONVENTIONAL WATER TUBE BOILER
62,000	38,000	62,000	27,450	38,000	38,000
15,790	35,608	35,608		14,990	34,808
14,500	14,500	14,500		3,500	1,500
21,240	21,240	21,240		21,240	21,240
400	4,000	400	1,200	4,000	4,000
1,000	1,400	1,000		1,000	1,000
	2,000		23,850	15,000	15,000
2,000	7,000			7,000	7,000
58	**62**	**67**	DRAVO **26**	**52**	**61**

DRAVO HEATERS HAVE EARNED HIGHEST ACCEPTANCE BECAUSE THEY

- *use less steel*
- *eliminate distribution piping*
- *have lower initial cost*
- *are very efficient in fuel consumption*
- *concentrate comfort heat at the working level*
- *reduce roof heat losses*
- *burn gas or oil*
- *are available in coal burning models*
- *save man hours through automatic operation*
- *require no attendant and negligible maintenance*
- *produce heat instantly and ONLY when needed*
- *have stainless steel chambers for longer life*
- *prevent rust and stain conditions in metal storage*
- *bear UL label and AGA approval*
- *require only stack, fuel and power line*
- *are portable and readily moved*
- *provide year 'round ventilation*
- *are ideal for process drying*
- *avoid freeze up worries, leaky traps, valves, etc.*
- *are shipped complete and flame tested*
- *can be installed on floor, wall or roof*
- *can be mounted upside down or horizontally*
- *eliminate ductwork with 150 ft. air throw*

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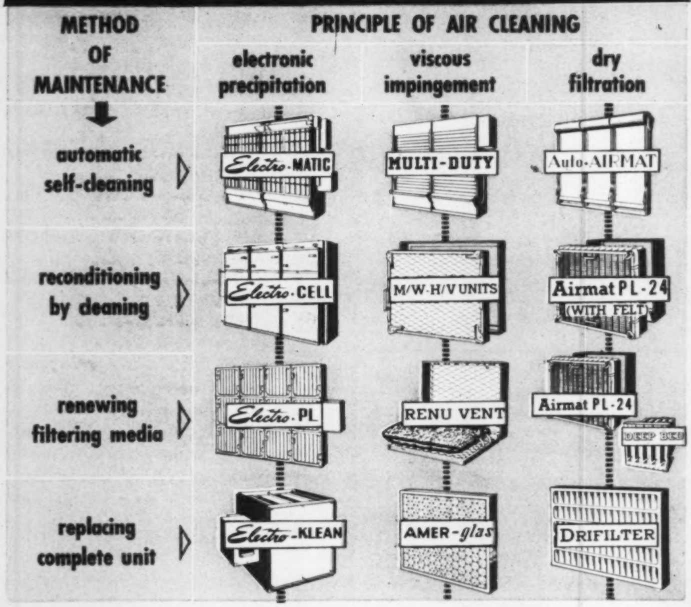
World's Greatest and Only Complete Line of Air Filtration and Dust Control Equipment

The AAF Line of *Engineered* Air Filters

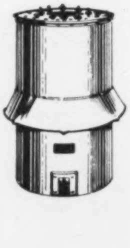


METHOD OF MAINTENANCE	PRINCIPLE OF AIR CLEANING electronic precipitation	viscous impingement	dry filtration
automatic self-cleaning	Electro-MATIC	MULTI-DUTY	Auto-AIRMAT
reconditioning by cleaning	Electro-CELL	M/W-H/V UNITS	Airmat PL-24 (WITH FELT)
renewing filtering media	Electro-PL	RENU VENT	Airmat PL-24 DEEP BED
replacing complete unit	Electro-KLEAN	AMER-*glas*	DRIFILTER

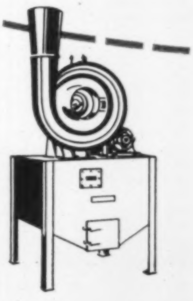
Greater emphasis on selecting the right air cleaner for a specific job has given new importance to American Air Filter's complete line. You see left, for example, twelve distinct types of AAF filters and electronic precipitators charted according to air cleaning principle and method of maintenance. These AAF products offer a wide selection of performance and operating characteristics to meet practically every air cleaning need.

Because of this complete line AAF engineers are not biased by a single type or design and can therefore recommend the filter best suited to the job.

Cycoil ENGINE AND COMPRESSOR FILTERS . . . AAF's Oil Bath Cleaner. Engineered to deliver practically 100% cleaning efficiency, this heavy-duty cleaner protects engines and compressors under conditions of severe dust and dirt. Over 90% of fine dust content in air is trapped in oil, then removed by centrifugal action, before reaching the filter. Added filtering action from filter pads, plus positive oil circulation which produces a self-cleaning action and great dust-holding capacity offers maximum air cleaning results.



ROTO-CLONE DUST CONTROL . . . AAF's line of dynamic and hydrostatic precipitators perform the functions of exhausting, separating and storing the dust in a single compact unit. Available in three distinct types and a complete range of sizes. Preferred throughout industry for simplicity, low operation cost, extreme compactness and maximum efficiency.



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Here is a 1951 innovation for school classrooms. It is the ONLY system of ventilation that traps drafts at the source, makes use of such air motion in controlling introduction of fresh air into rooms, automatically maintaining a healthful, comfortable temperature.

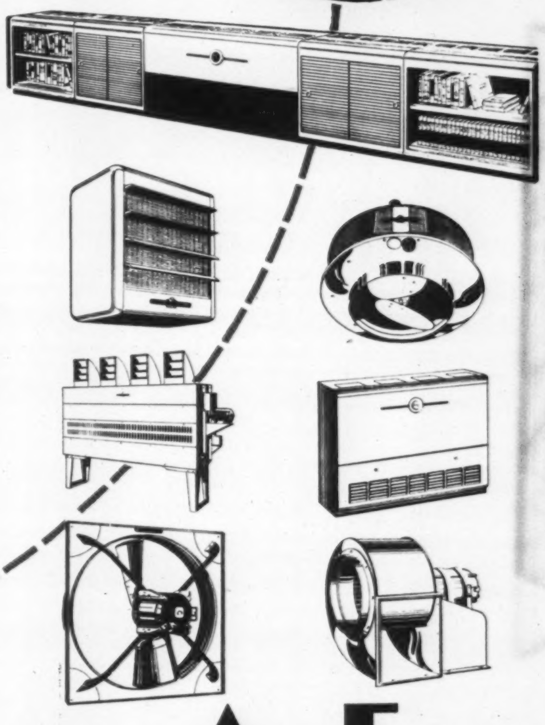
UNIT HEATERS

A complete line of unit heaters including horizontal and vertical propeller-fan type, de luxe, and centrifugal fan-type units. A model and size for every steam or hot water application—request detailed performance data.

PROPELLER FANS—UNIT BLOWERS

Long service of Herman Nelson propeller fans can be attributed to the quality of material and simplicity of design. Fan blades with "air foil" profile produce maximum air delivery . . . efficiently and quietly.

Whatever your requirements for large volume air delivery, there's a size and type of Herman Nelson Unit Blower to serve you. A national field organization assures rapid service. Request complete range of sizes.



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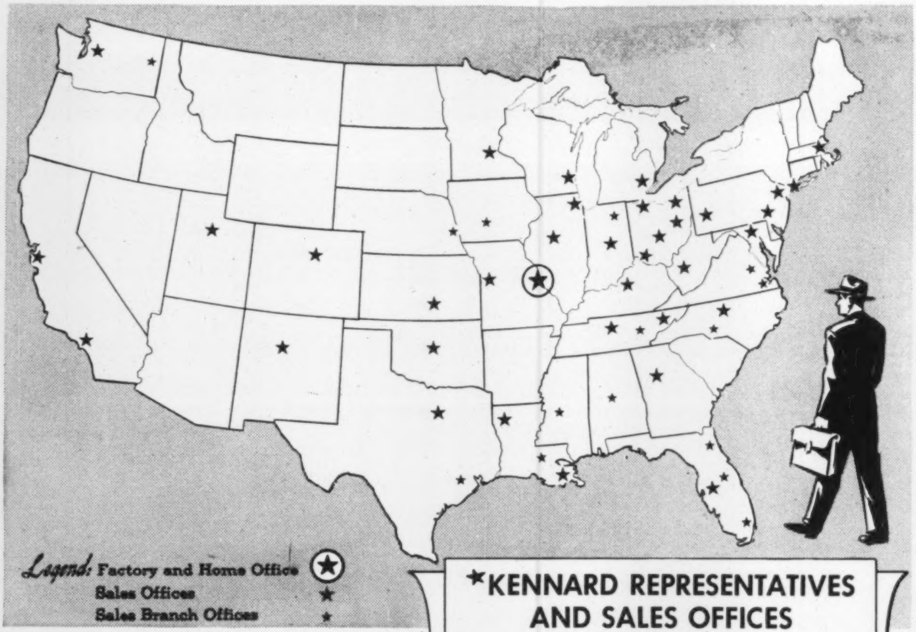
IS BETTER AIR

American Air Filter
COMPANY INC.,
HERMAN NELSON DIVISION
PLANTS: LOUISVILLE, KENTUCKY, MOLINE, ILLINOIS



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HEATING & VENTILATING CO.
Gas furnaces
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Mr. M. Hochede, General Manager
New Mission Heating & Ventilating Co.
San Francisco, Calif.

"SUBSTANTIAL SAVINGS"

with

QC METALBESTOS

GAS VENT

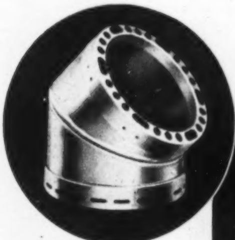
reported by San Francisco contractor.

Mr. M. Hochede, General Manager of the New Mission Heating & Ventilating Company, having recently completed work on a large housing project, has this to say about Metalbestos Gas Vent Pipe:

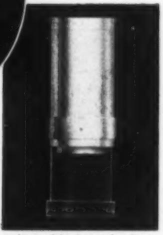
"When QC Metalbestos was first manufactured by the William Wallace Company, we could see that there would be a substantial saving in labor increasing our profits and enabling us to do more work with the same amount of men. As one of the most vital things in any business is labor, we werc quick to adopt this new product."

LOWER INSTALLATION COSTS were possible because lightweight self-aligning sections go quickly into place. No special tools or skills needed. Adjustable lengths and versatile fittings eliminate costly cutting and special fabrication . . . keep labor costs to a minimum.

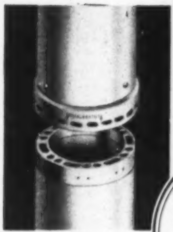
Order from your jobber or write to Dept. N



Adjustable Elbows simplify installation.



Adjustable Length eliminates cutting and fitting.



Quick Coupling speeds assembly.

Metalbestos Gas Vent pipe meets all safety requirements of the Underwriter's Laboratories for Type B Gas Vents.

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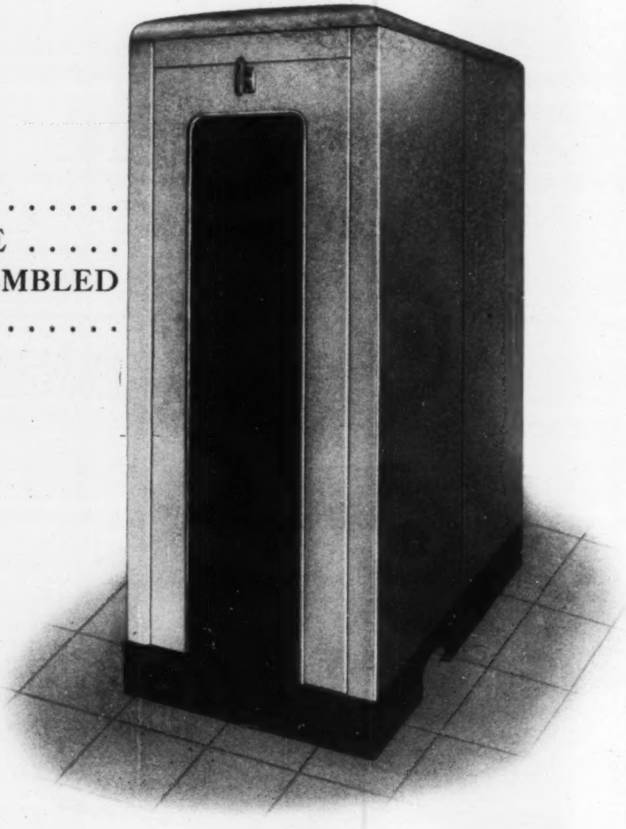
Designed by Atlas...

STURDY . . . .
WELL MADE . . . . .
EASILY ASSEMBLED
BEAUTIFUL . . . . . .



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These days a builder jacket is more than just a necessary protective covering for your product. Properly designed, it is a means of attracting more prospects, creating more sales, and making both the sale and the installation easier and less costly than ever before.

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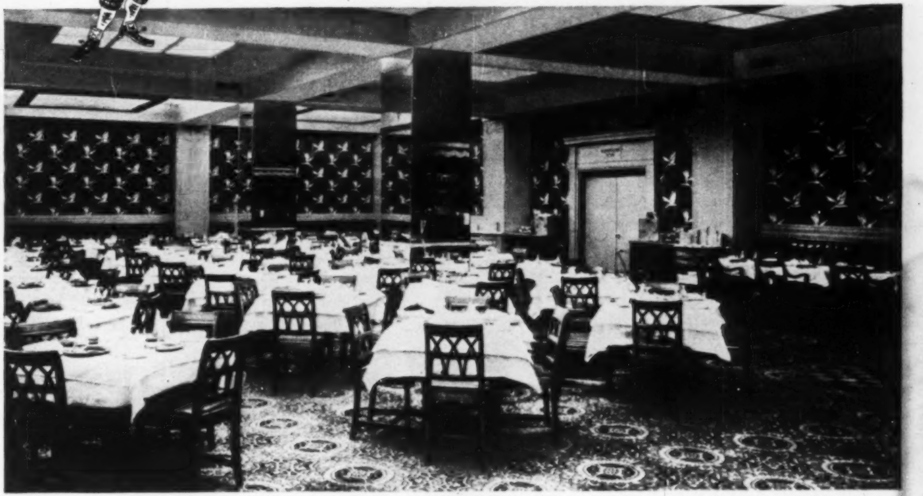
Famous BRASS RAIL Restaurant saves $5500

on its air conditioning investment with DOREX AIR RECOVERY



When the Brass Rail, Inc., put cooling equipment in its restaurant at 521 Fifth Avenue, New York, the inclusion of Dorex Air Recovery in the air conditioning system reduced needed refrigeration capacity by 25 tons—made a net capital cost saving of $5,500. Since installation, savings in operating costs have run around $500 per year.

YOU CAN SAVE SUBSTANTIALLY, TOO. Dorex Air Recovery pays its way for every operator of an air conditioning system.

Briefly, Dorex Air Recovery "manufactures" *new* air by passing *used* air through Dorex Activated Carbon—the most effective odor-adsorbing agent known. This reduces, by as much as two-thirds, the amount of fresh air that has to be taken into the system—saving substantial heating and cooling costs.

Dorex Air Recovery has been saving money for users for more than 20 years . . . and more than 6,000 users are saving millions annually with it. Find out how Dorex Air Recovery can reduce *your* air conditioning costs. Send coupon today.

TRADE MARK "DOREX" REG. U. S. PAT. OFF.

DOREX

Air Recovery

W. B. CONNOR ENGINEERING CORP.

Danbury, Connecticut

Air Diffusion • Air Purification • Air Recovery

In Canada: Douglas Engineering Co., Ltd.,
190 Murray Street, Montreal 3, P. Q.

W. B. CONNOR ENGINEERING CORP.
Dept. A-11, Danbury, Connecticut

Please send me, without obligation, full information on Dorex Air Recovery.

Name ....

Position ....

Company ....

Street ....

City.......................... **Zone**..... **State**.......

A new concept in Pneumatic Control:

The Taylor TRANSET* Control System

- **MORE ACCURATE MEASUREMENT**
- **CLOSER CONTROL ON ANY PROCESS**
- **CONTINUOUS SPACE-SAVING RECORDS**
- **HIGHER PROCESSING EFFICIENCY**

Taylor has developed a new controller and a new recorder to take full advantage of the recently announced Taylor TRANSAIRE* Temperature Transmitters and their fast measuring systems. Each instrument takes advantage of the other's superior performance to give better control over the notoriously slow rate of heat transfer inherent in air temperature measurement. It gives unprecedented quality of measuring, controlling, and recording. **Now available in a complete system.**

1. FASTER MEASURING INSTRUMENTS. Taylor's TRANSAIRE, force-balance temperature or pressure transmitters, created new standards in the measurement of *changing or dynamic* temperatures and pressures. With derivative action (SPEED-ACT*) in the measuring system, they transmit process changes with unbelievably fast accuracy. Many other features.

2. FASTER CONTROL with Stability! Taylor's new TRI-ACT* Controller combines a wider range of response adjustments, an increased capacity relay air valve, and a *new control circuit*, to take advantage of the faster measuring systems. This new force-balance controller permits 4 times faster reset rate and 4 times faster rate action (PRE-ACT*) than conventional controllers. No overpeaking. Faster recovery for load changes on pressure, flow, and temperature applications—because rate action is in *the new circuit*.

3. MIDGET RECORDER saves space. New TRANSET Recording Receiver greatly reduces panel space. Fits 3⅞" x 4½" panel opening, making it especially adaptable to graphic panels. Gives continuous 30-day process record, with 3 hours visible—remote setting of control point—automatic to manual control—instant check on controller performance and the control valve position.

We sincerely believe this new Taylor-engineered TRANSET Pneumatic Control System combines *the best transmitter, the best controller, and the best recorder* on the market. Find out more about it, and put it to work for you! Write for **BULLETIN 98097,** and ask your Taylor Field Engineer. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

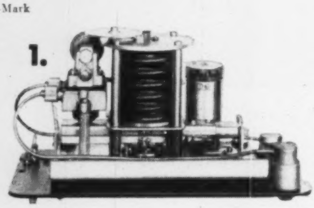
Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.

Taylor's Centennial
ACCURACY FIRST SINCE 1851

TRANSAIRE ➔ TO TRI-ACT ➔ TO TRANSET

*Trade-Mark

1.



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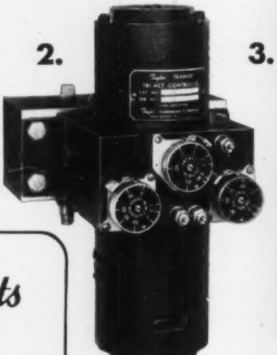

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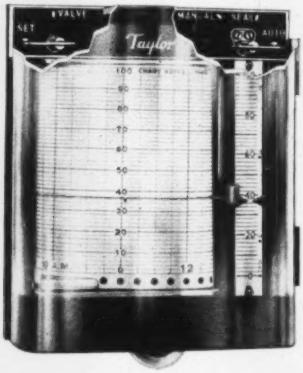
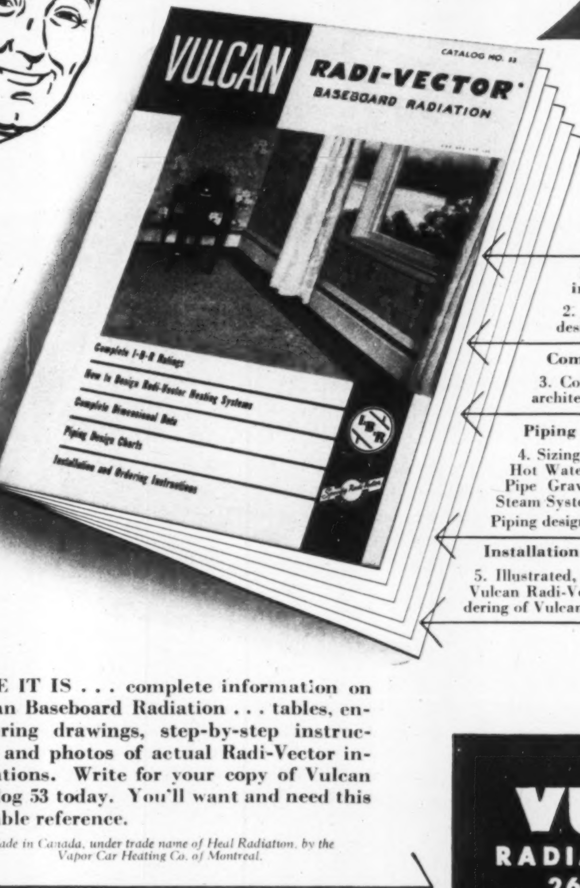


Taylor Instruments
MEAN
ACCURACY FIRST
IN HOME AND INDUSTRY

1. TRANSAIRE force-balance temperature or pressure transmitter with SPEED-ACT gives rate action in the measuring circuit. **2. TRI-ACT Controller.** Has high capacity relay air valve for faster response to new control circuit. Wider response adjustments. **3. TRANSET Recorder.** Fits 3⅞" x 4½" opening . . . a "natural" for graphic panels; a great space saver for conventional panels.

YOURS FOR 1951
Complete Information on RADI-VECTOR*
*VULCAN BASEBOARD


VULCAN

CATALOG NO. 53

RADI-VECTOR*
BASEBOARD RADIATION

Complete I-B-R Ratings
How to Design Radi-Vector Heating Systems
Complete Dimensional Data
Piping Design Charts
Installation and Ordering Instructions

Complete I=B=R Ratings

1. Ratings for Vulcan Radiation as approved by the Institute of Boiler and Radiator Manufacturers.

How to design Radi-Vector Heating Systems

2. Step-by-step procedure as a guide in designing a typical Vulcan installation.

Complete Dimensional Data

3. Complete Roughing-in Dimensions to aid architect and installer.

Piping Design Charts

4. Sizing Radi-Vector Connections for One-Pipe Hot Water, Two-Pipe Forced Hot Water, Two-Pipe Gravity Hot Water Systems; Two-Pipe Steam Systems.
Piping design for Radi-Vector in Series system.

Installation and Ordering Instructions

5. Illustrated, step-by-step instructions for installing Vulcan Radi-Vector; details for most satisfactory ordering of Vulcan Radiation.

HERE IT IS . . . complete information on Vulcan Baseboard Radiation . . . tables, engineering drawings, step-by-step instructions and photos of actual Radi-Vector installations. Write for your copy of Vulcan Catalog 53 today. You'll want and need this valuable reference.

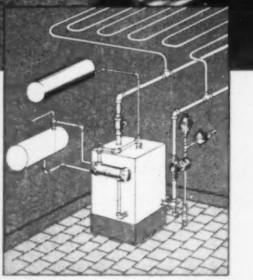
Made in Canada, under trade name of Heat Radiation, by the Vapor Car Heating Co. of Montreal.

Over a Quarter Century of Fin-Tube Radiation

VULCAN
RADIATOR COMPANY
26 Francis Avenue
Hartford, Connecticut

FORCED CIRCULATING FLOW CONTROL HOT WATER HEATING

Your customers enjoy the finest home heating when you install THRUSH


The Complete Forced Circulating Thrush Flow Control System of Hot Water Heat

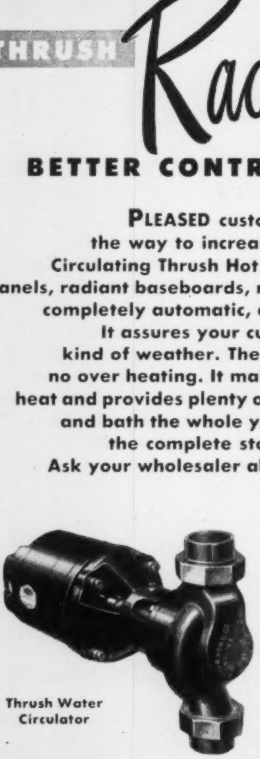
THRUSH Radiant Heat...

BETTER CONTROL AT LOWER COST

PLEASED customers tell their friends. That's the way to increase business . . . and profit. Forced Circulating Thrush Hot Water Heat, whether you use radiant panels, radiant baseboards, radiators or convectors, is simple, completely automatic, easy to install and low in cost. It assures your customers automatic comfort in any kind of weather. There is no fuel waste because there is no over heating. It maintains a constant flow of radiant heat and provides plenty of hot water for kitchen, laundry and bath the whole year through. Get our booklet giving the complete story of Thrush Radiant Hot water heat. Ask your wholesaler about it or address Dept. E-1.

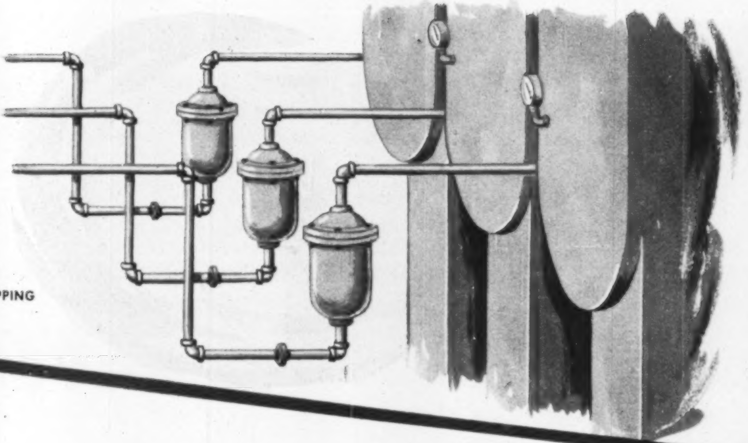
No. 201 Radiant Heat Control

Thrush Flow Control Valve with Air Vent Tube


Thrush Water Circulator

H. A. THRUSH AND COMPANY
PERU · INDIANA

Thrush Hot Water Heater



OLD STYLE TRAPPING

ARE YOU THROWING GOOD MONEY AFTER BAD

by standardizing on poorly designed traps?

Many companies tell us they always install the same type of trap because they only want to carry one line of valves and seats or because their workmen are familiar with a certain type. However, if the make of traps used need extra labor to install and require more maintenance, you're throwing good money after bad *every time you install or service a trap.*

Instead of pursuing this wasteful policy, many manufacturers today are discovering it's more economical to replace all their steam traps with SUPER-SILVERTOPS. These traps have many cost saving advantages available with no other trap. For instance, they can be installed as an elbow or straight in line, saving up to 7 fittings plus 50 MINUTES of costly installation time. In addition, they can be inspected or serviced without disturbing piping. Furthermore, SUPER-SILVERTOPS require less maintenance. They are the only trap with a patented guided bucket, eliminating uncontrolled bucket action which leads to bucket damage.

Start today to convert to SUPER-SILVERTOPS. See your nearest Super-Silvertop representative or write us direct.

SUPER-SILVERTOP
STEAM TRAP

IN-LINE OR AS AN ELBOW

SUPER-SILVERTOP
STEAM TRAPS
Save Money

THIS BOOK SOLVES STEAM TRAP PROBLEMS

This 36-Page book contains complete data on the selection and installation of steam traps for all services. Mail coupon for your copy today.

THE V. D. ANDERSON COMPANY
1949 WEST 96th STREET • CLEVELAND 2, OHIO

Name ______________________

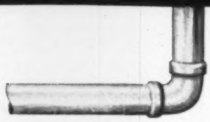
Address ______________________

City ______________________

In Canada: Bawden Machine Co., Toronto

SEE OUR EXHIBIT NO. 630 AT THE 10th INTERNATIONAL HEATING AND VENTILATING EXPOSITION, PHILADELPHIA, JAN. 22-26

HIDDEN SERVANT—



STEEL PIPE

There's a heap of good living attributable to the hidden servant—steel pipe. For instance: in all likelihood it carried the gas that ripened the fruit, that cooked the cereal, that roasted the coffee, that smoked the bacon, that pasteurized the cream you had for breakfast this morning. And that's not all!

Pipe plays an important part in the factories that made the clothes you wear, the car you drive, the telephone you use, the radio or television you'll enjoy in the comfort of your living-room this evening.

Whether used for heating, plumbing, air-conditioning, or refrigeration—where you live, where you work, where you play—the hidden servant, steel pipe, is on duty 24 hours a day, 365 days a year guarding the health, comfort, and security of the nation.

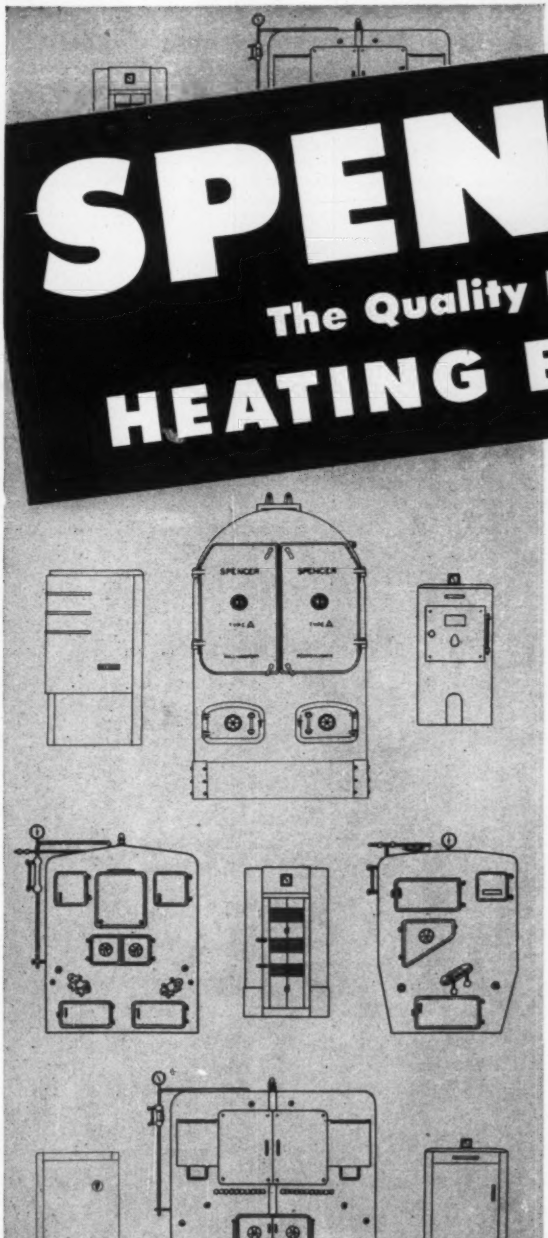
—pipe with the yearmark!

WHEATLAND TUBE COMPANY

BANKERS SECURITIES BUILDING • PHILADELPHIA 7, PENNA.

SPENCER

The Quality Line of
HEATING BOILERS



**VERSATILE
DEPENDABLE . . .**

***Backed by more than
60 years' leadership***

There is a SPENCER for every building ... for every fuel, with capacities from 290 to 45,000 square feet, steam. Precision engineered and manufactured to give superior, guaranteed service.

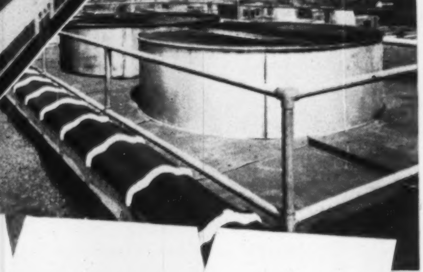
Visit our Booth No. 148

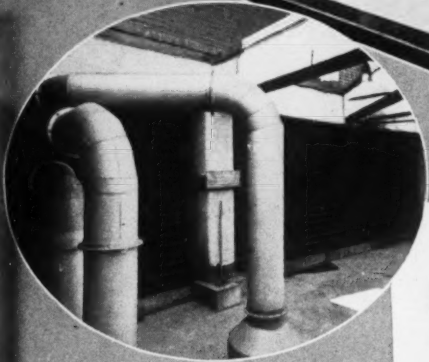
at the International Heating and Ventilating Exposition, Commercial Museum, Philadelphia, Pennsylvania.

JANUARY 22-26, 1951

**SPENCER
HEATER**
LYCOMING-SPENCER DIVISION
WILLIAMSPORT LYCO PENNSYLVANIA

View of top of tower, showing fan guards.





Air inlet louvres shown in photo are heavy 1" x 8" California Redwood.

HIDDEN COOLING TOWER

Preserves Building Appearance; Still Does Its Job

To look at it you'd never believe there's a water cooling tower serving the air conditioning system for this modern pharmaceutical plant. Even after a second look, you won't find it because it is "camouflaged" into the very top of the building itself. The tower is ruggedly constructed of Construction Heart Grade of California Redwood with an outer casing of brick to match the building's architecture. This cooling tower carries the same guarantees as any other C. H. W. tower, including guaranteed fan horsepower and guaranteed water cooling performance—and yet with a harmonizing casing for appearance as well as safety to meet city fire regulations. When you need a cooling tower for air conditioning or any other application, consult C. H. Wheeler for a custom-built job. Write for descriptive literature.

C. H. WHEELER MANUFACTURING CO.
1826 Sedgley Avenue, Philadelphia 32, Pa.
REPRESENTATIVES IN MOST PRINCIPAL CITIES

SINCE 1903

This C. H. Wheeler water cooling tower serves the air conditioning system installed in the new plant of the **Smith, Kline and French Laboratories, Philadelphia, Pa.** Responsible for this new building and its air conditioning system were The Ballinger Co., architects; Riggs, Distler & Co., Inc., contractors; and Barclay, White & Co., builders. Carrier Corp. furnished the refrigeration machinery.

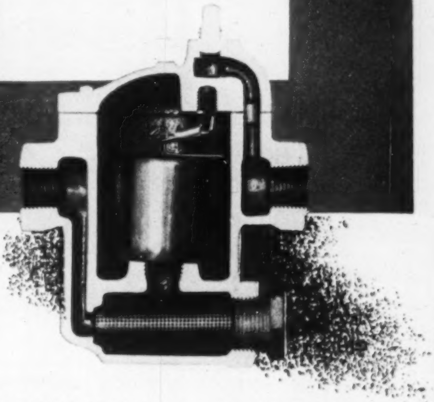
C. H. Wheeler

STEAM CONDENSERS • WATER COOLING TOWERS
EJECTORS • STEAM JET VACUUM REFRIGERATION
OF PHILADELPHIA

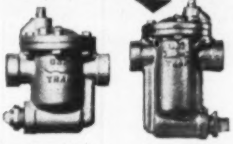
Money Saving Steam Traps with the Strainers *Built Right In*

. . . *Now Available in Two Sizes*

FIRST—THE ARMSTRONG No. 880
AND NOW—THE LARGER No. 881

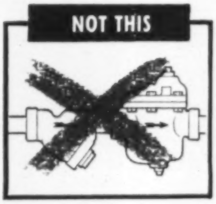


VITAL STATISTICS



	No. 880	No. 881
Pipe Connections	½" or ¾"	½" or ¾"
Operating Pressure	150 psig	250 psig
Capacity, lbs. per hour continuous discharge	450-690	760-1060
Height	5⅞"	7 1/16"
Diameter	5"	5"
Weight	5 lbs.	6 lbs.

NOT THIS



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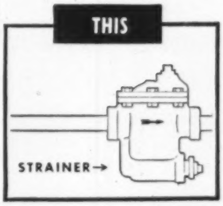


AN ECONOMICAL steam trap for draining small equipment naturally has a small discharge orifice. When dirt or scale conditions are bad it is recommended that a strainer be installed ahead of such a trap to avoid clogging.

Either the Armstrong No. 880 or No. 881 trap is a perfect answer for such a condition. In each the strainer is built right into the body, thereby eliminating a separate strainer, extra fittings and considerable installation labor. Best of all, these traps cost less than a standard trap plus a separate strainer. Look over your small trap applications and order the traps you need now from your local Armstrong representative's stock.

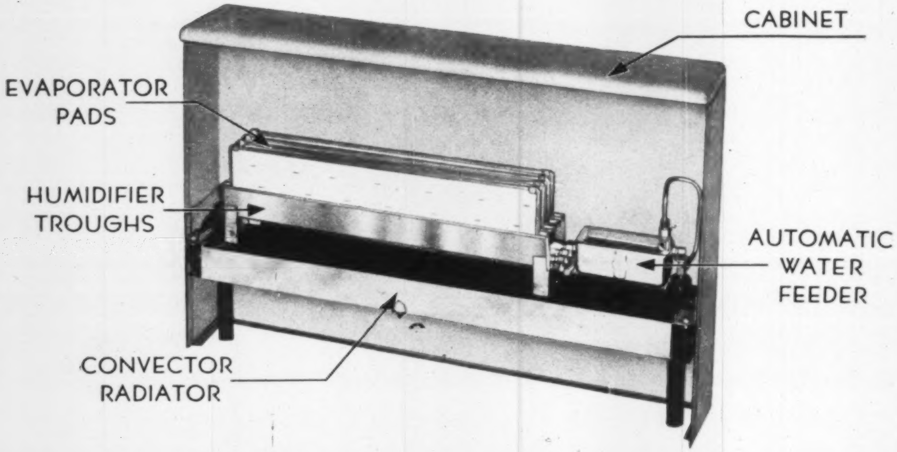
ARMSTRONG MACHINE WORKS
874 Maple Street • Three Rivers, Mich.

FOR COMPLETE DATA on correct selection and installation of steam traps for any service or any pressure, send for your copy of the 36-PAGE ARMSTRONG STEAM TRAP BOOK, or see our Catalog in Sweets or Chemical Engineering Catalog.

The ARMSTRONG BOOK

ARMSTRONG STEAM TRAPS

THE *NEW* MAID-O-MIST CABINET CONVECTOR HUMIDIFIER



The only automatic humidifier on the market made especially for modern convector radiators!

BIG FEATURES

BIG PERFORMANCE

- Only 3-$\frac{3}{8}$ inches deep. Fits even the extremely shallow convector cabinets.
- Water is supplied directly to feeder from the convector on hot water systems. On steam installations, water is taken from nearest supply through copper tubing.
- Completely automatic. Float-controlled valve keeps water line constant.
- Maximum evaporating area. Unique design of water troughs make every inch of this humidifier a working surface which creates more evaporating area.
- Minimum air restriction. The separate, narrow $\frac{3}{8}$ inch troughs which hold the evaporator pads are spaced to allow free flow of heated air between the pads and on all sides of unit.

Available in both 2 and 4 trough units in 10 different sizes.

The new Maid-O'-Mist Cabinet Convector Humidifiers are made in evaporating capacities of 1 to 5 gallons per day. Construction throughout is of non-ferrous metal. Easy to install. Get full information from your jobber or write us direct for complete details.

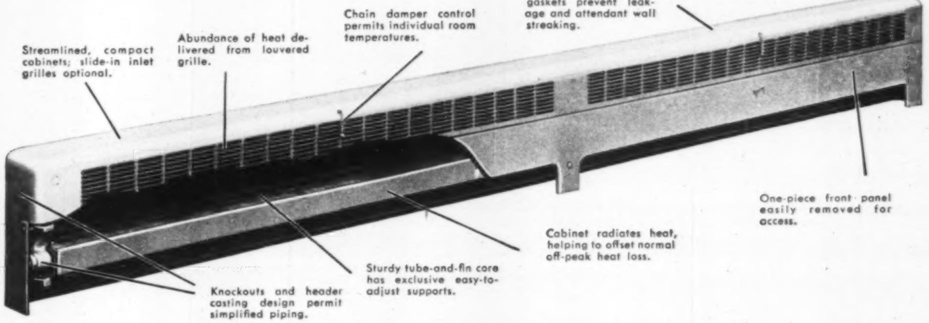
MAID-O'-MIST Inc.
HEATING SPECIALTIES

AUTOMATIC HUMIDIFIERS . . . . . AUTO-VENTS
WATER LINE CONTROLS . HEATING SPECIALTIES
MAID-O'-MIST, Inc.
3217 NORTH PULASKI ROAD . CHICAGO 41, ILL.

ANNOUNCING YOUNG...

Low-Level Convector-Radiators

FOR INSTALLATION BENEATH PICTURE WINDOWS


Streamlined, compact cabinets; slide-in inlet grilles optional.
Abundance of heat delivered from louvered grille.
Chain damper control permits individual room temperatures.
Felt strips and corner gaskets prevent leakage and attendant wall streaking.
One-piece front panel easily removed for access.
Cabinet radiates heat, helping to offset normal off-peak heat loss.
Sturdy tube-and-fin core has exclusive easy-to-adjust supports.
Knockouts and header casting design permit simplified piping.

Here is a Convector-radiator just 12″ high, yet capable of providing a blanket of warm air for the "room with a view."

It's the Type "FL" model—the latest addition to the Young line of Convector-radiators—for use with any hot water or two-pipe steam system. Low-level cabinets are available in a wide selection of sizes, ranging from 20″ to 112″ in length, 4″, 6″, and 8″ in depth, and for either free standing or semi-recessed installations.

Specify "Young" for your convector-radiator requirements. All models are tested and rated in accordance with Commercial Standards CS 140-47, as developed cooperatively by the trade and national Bureau of Standards, U. S. Department of Commerce.

Catalog No. 4150, just released, gives roughing-in dimensions, ratings, etc. Write now for your copy.

YOUNG

Heat Transfer Products for Automotive and Industrial Applications.

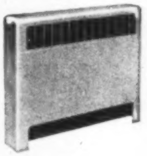
Young Quality

Reg. U. S. Pat. Off.

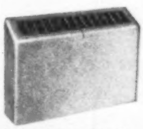
Heating, Cooling, Air Conditioning Products for Home and Industry.

YOUNG RADIATOR COMPANY
DEPT. 511-A RACINE, WISCONSIN
Plants at Racine, Wisconsin and Mattoon, Illinois
Sales and Engineering Representatives in All Principal Cities

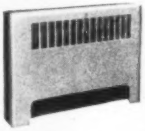
OTHER STANDARD TYPES



Free Standing Type "F"—Suitable for either free-standing or semi-recessed installation.

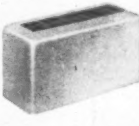


Wall-Hung Type "S"—Sloping top grille. Wall-hung model facilitates cleaning of floors.



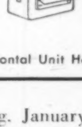
Partially-Recessed Type "R"—Cabinet fits into wall recess conserving valuable floor space.

Type "FR," Fully Recessed Model. Designed for full utilization of room space.

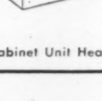


Bathroom Type "B"—Compact wall-hung unit permits installation under average lavatory fixture.

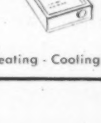
"YAC" Air Conditioners



Horizontal Unit Heaters



Cabinet Unit Heaters



Heating - Cooling Coils

"Vertiflow" Unit Heaters

Zallea Expansion Joint News

PUBLISHED BY ZALLEA BROTHERS—WORLD'S LARGEST MANUFACTURERS OF EXPANSION JOINTS EXCLUSIVELY

Expansion Joint of the Month

GAS TRANSPORTER USES ZALLEA

ZALLEA EXCLUSIVE FEATURES

Zallea Stainless Steel Expansion Joints have many features not found in competitive products. The control exercised in production and design, resulting from continuous research, accounts for their exceptionally long life. Designed with large radii at the root and crest of each corrugation, there are no sharp corners or circumferential welds to set up stress concentrations, which cause early failure. Hydraulically formed from cylinders having only longitudinal welds, the thickness of which is the same as the parent metal without grinding, they are subjected to internal forming pressures many times in excess of the design working pressure. After forming, the corrugated bellows is annealed in furnaces controlled by recording potentiometers. This is followed by pickling and passivating in controlled temperature acid baths to remove the scale formed during the annealing and to impart a corrosion resisting surface to the metal. Without proper pickling and passivation, the bellows would rust almost as rapidly as carbon steel in the average atmosphere. For longer service life . . . for the *best* in expansion joints, insist on Zallea . . . you'll find it pays!

FIRST
of its
KIND!

The supply is going fast . . . send *TODAY* for your copy of Catalog 47, a text book and valuable reference source on all Zallea Expansion Joints.

Zallea Brothers, 816 Locust Street,
Wilmington 99, Delaware.

Our Readers Ask

Q. *We installed (censored) expansion joints in our pipe lines. Two failed at the weld. What is being done industry-wise to overcome this condition? G. S. Thomas, Grand Rapids, Michigan.*

A. We here at Zallea have been well aware of this general condition for many years, Mr. Thomas. And we did something about it. Accelerated flexing tests of corrugated bellows proved that the resultant welding bead of a shielded arc weld was detrimental to the life of the bellows because failure always occurred across the weld—thickest section of the bellows. We found that by adopting an *exclusive* variation of the Heliarc process and adding a grain refining procedure to the finished weld, we could produce a corrugated bellows that under extreme flexing tests *failed in the parent metal only.* After hundreds of tests made with Zallea *controlled* welding, not one failure occurred within 30 degrees of the weld line. More important was the fact that these bellows lasted four to eight times longer than bellows having a shielded arc welding bead.

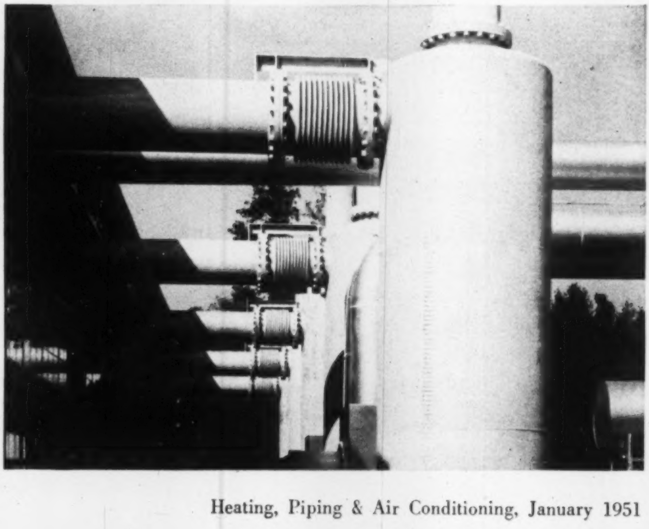
29 Flexible Connectors Installed on Diesel Exhaust Lines

Shown here are five 24″ diameter Zallea Type 347 Stainless Steel Flexible Connectors installed on the Diesel exhaust lines at a compressor station along one of the nation's largest natural gas transmission lines. Five modern, well-equipped compressor stations in the system depend on 29 Zallea Stainless Steel Flexible Connectors for assurance of dependable performance and uninterrupted service.

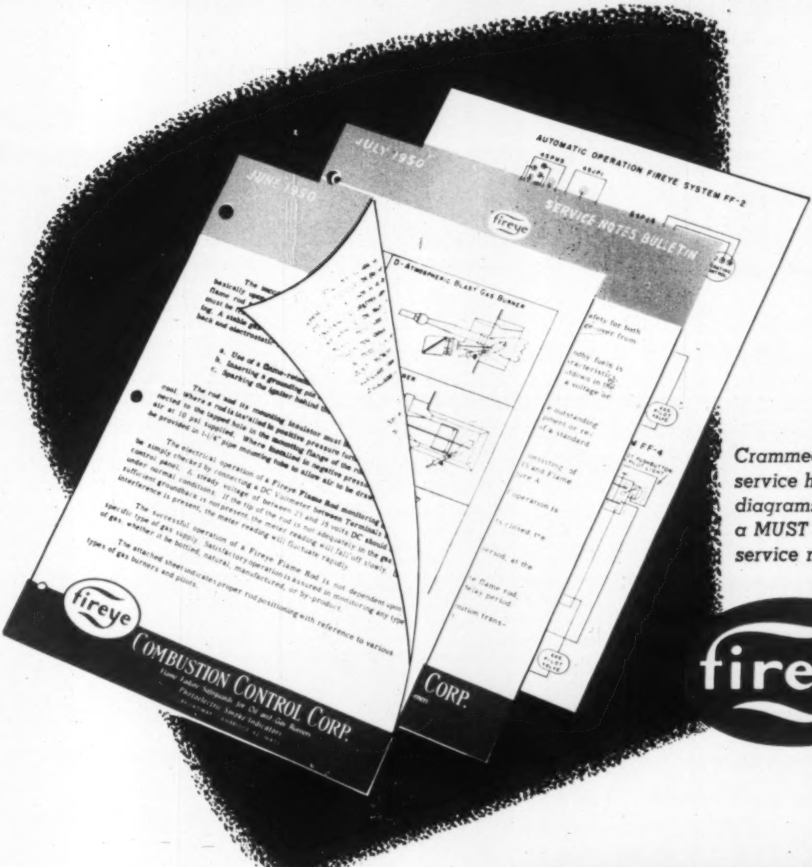
Absorb Lateral and Axial Movement

Here, as in thousands of installations throughout industry, Zallea Stainless Steel Flexible Connectors are built to absorb *both* lateral and axial movement. They are extremely flexible and long-lasting because of their design, having a true bellows form. Hydraulically formed and with uniform wall thickness, all corrugations are annular and parallel, with the axis perpendicular to the centerline of the connector.

All Zallea Stainless Steel Flexible Connectors are formed from tubes having a single longitudinal weld to provide for longer service life. They are permanently gas-tight and require no packing.



ARE THESE *New* BULLETINS IN YOUR SERVICE MANUAL?


JUNE 1950
JULY 1950
fireye
SERVICE NOTES BULLETIN
AUTOMATIC OPERATION FIREYE SYSTEM FF-2
D-ATMOSPHERIC BLAST GAS BURNER
COMBUSTION CONTROL CORP.
CORP.

Crammed with useful service hints and diagrams . . . these are a MUST for every service man.

fireye

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There's a reason for Fireye's unprecedented popularity: it's the most positive and foolproof flame-failure protection . . . and that's why it sells itself to engineers who specify, install and service oil and gas burners for modern industry.

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☑ Simplified Control for Combination Gas/Oil Burners.
☐ The Complete Fireye Story

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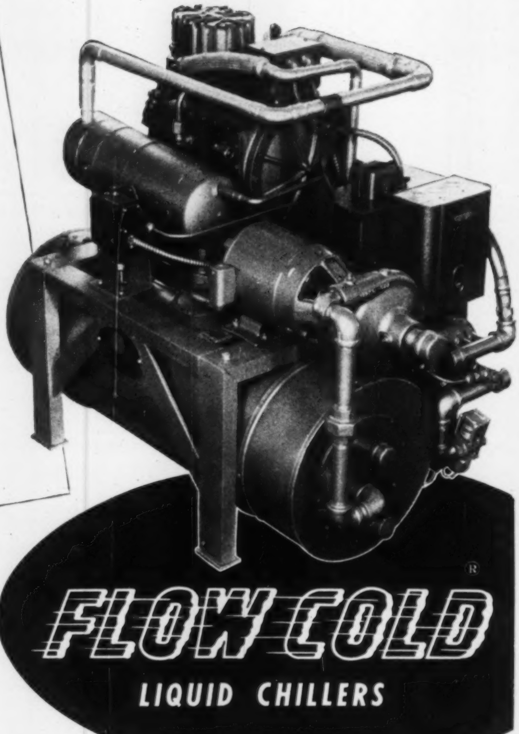
Acme



FLOW COLD®
LIQUID CHILLERS

FOR AIR CONDITIONING
INDUSTRIAL OR COMMERCIAL REFRIGERATION

ACME FLOW COLD Systems give you the ultimate in Air Conditioning, on hundreds of applications such as professional offices, institutions and hospitals, motels and tourist courts, stores, fitting rooms, hotel suites, beauty parlors, barber shops, homes and many others. Easily adapted to your present Heating System.

ACME FLOW COLD Units are equally efficient for cooling drinking water, and for all industrial process temperature control or commercial cooling operations. ACME FLOW COLD Liquid Chillers are ruggedly constructed and are designed for many years of efficient, low cost service.

ACME FLOW COLD UNITS ARE:

- Compact and Easy to Install.
- Designed for Applications where Space or Access is a Problem.
- Furnished Complete with Wiring, Refrigerant Piping, and all Controls, Factory Tested, Ready for Water and Electrical Connections.
- Matching Acme Convectors, Coils and Cooling Towers.

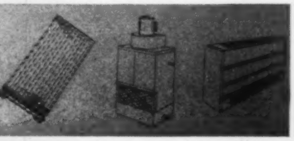
Contact your nearest distributor or write direct for complete information and specifications.

See us at Booths 26 and 414 at the Philadelphia Show in January

"Continuously serving the Air Conditioning and Refrigeration Industry SINCE 1919."

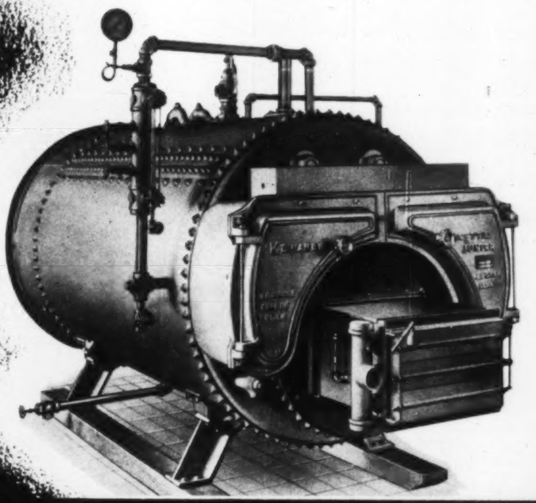
ACME PRODUCTS

ACME INDUSTRIES, INC.
JACKSON, MICHIGAN



NOW FIRE ALL 3

● SCOTCH MARINE, CAST IRON and STEEL HEATING and POWER BOILERS



Scotch Marine type boilers, air heaters and any other type of "cold" furnace can be fired by natural gas at higher ratings. The Webster Kinetic Burner is easy to install, compact and economical to operate. It fires with extremely low pressure gas without noise, vibration or electric power and with minimum furnace draft.

WEBSTER KINETIC* BURNER

(LOW PRESSURE GAS)

The Webster Kinetic consists of a multiplicity of full venturi mixers with flame retention nozzles. These are assembled in a metal casing complete with pilot and louvre. It may be used with natural, mixed or liquefied petroleum gases. Standby oil burners may be used when desired.

As a multiple head assembly it is available in 25 standard sizes of from 4 heads to 48 heads, and can be supplied in any size or shape. Natural gas input ratings from 560,000 Btu/hr to 6,720,000 Btu/hr at 4" wc.

For complete information request Series B8 Bulletins.

*TRADEMARK

Kinetic assembly illustrated is No. 27. Requiring plate opening of only 8½" high and 28½" wide.

The WEBSTER ENGINEERING COMPANY

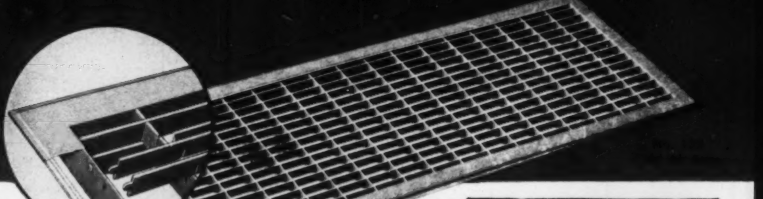
TULSA, OKLAHOMA

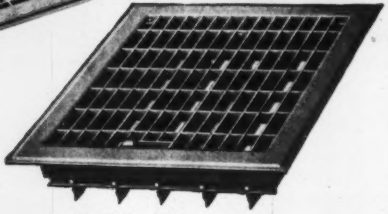
Division of SURFACE COMBUSTION CORPORATION, Toledo, Ohio

INDEPENDENT "*Fabrikated*"

Reg. U. S. Pat. Off.

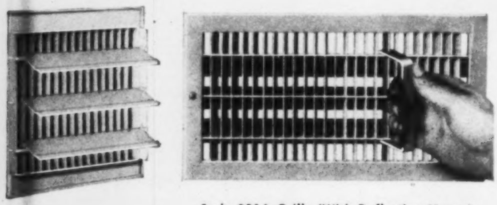
AIR CONDITIONING REGISTERS AND GRILLES





No. 32 Floor Register

"Fabrikated" construction, originated by Independent, has met wide acceptance because of its pleasing appearance, strength and rigidity. "Fabrikated" construction also provides more than usual free area, furnishing greater capacities for the same size opening. At the same time uniformity of design in wall, baseboard or floor registers and grilles is now possible.



Style 321A Grille (With Deflecting Vanes)

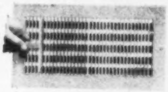
INDEPENDENT "*Fabrikated*" WALL GRILLES

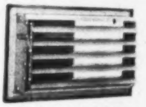
With Deflecting Vanes Provide 4-Way Air Flow

Compound deflections of air flows can be achieved with accuracy and certainty either at installation or any time afterward to meet changed conditions. Furnished with vertical grille bars and horizontal deflecting vanes or with horizontal grille bars and vertical deflecting vanes.

Practically any size in even inches. These same grilles are supplied without deflecting vanes to provide 2-way air flow.

INDEPENDENT WROUGHT STEEL AIR CONDITIONING REGISTERS

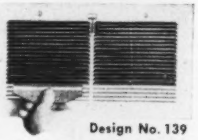




Design No. 238

Vertical grille bars are manufactured at an angle of 30 degrees, one half to the right, one half to the left. They may be bent straight outward or to direct air flow at any other right or left angle. Multiple valves at the rear can be set to deflect air flow up, down, straight out, or for complete closure. Made for baseboard or wall installation.

INDEPENDENT WROUGHT STEEL REGISTERS



Design No. 139

Design No. 39-WG

These registers do not compete with "Fabrikated." They comprise a high grade line of air conditioning registers of attractive appearance which are desirable for lower priced installations. Made in both wall and baseboard types.

Independent
REGISTERS AND GRILLES
THE INDEPENDENT REGISTER CO

WRITE FOR COMPLETE CATALOG

Always Leading . . . Always Progressing

THE INDEPENDENT REGISTER CO.

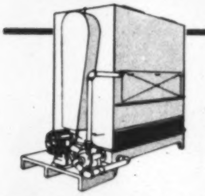
3747 East 93rd Street, Cleveland 5, Ohio

Marlo GOES TO MARKET TO ASSURE **BETTER COOLING**

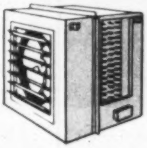
BETTENDORF'S

AMERICA'S MOST MODERN SUPERMARKET DEPENDS UPON MODERN MARLO EQUIPMENT

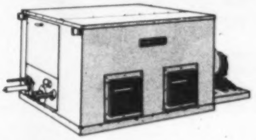
Serving the people of Greater St. Louis, Bettendorf's in Clayton, Mo., combines many striking new advances in supermarket design and service. To meet varied cooling needs in the store, one of the largest of its kind, efficient Marlo equipment was selected—



EVAPORATIVE COOLING UNITS—The 100-Ton Marlo Evaporative Condenser and 60-Ton Marlo Cooling Tower assure *maxium water savings*. Cooling Tower provides condensing water for 7 Frick and 12 Hussman compressors.



LOW TEMPERATURE UNIT—In the *frozen food cooler*, temperature is maintained at —5F by a Marlo LT-184 patented Low Temperature Unit with automatic electric defrost.



AIR CONDITIONING UNITS—The store's *gigantic shopping area* is served by efficient, compact Marlo Floor and Ceiling Type Air Conditioning Units.

MARLO HEAT TRANSFER
Since 1925

Write for information on the complete line of Marlo equipment.

AIR CONDITIONING CONTRACTOR—*L. V. Fleiter Co., St. Louis*
ARCHITECTS—*Wischmeyer and Lorenz, St. Louis*
GENERAL CONTRACTOR—*Dickie Construction Co., St. Louis*

Visit the Marlo exhibit—Booths 3 and 5 at the 10th Air Conditioning Exposition, Commercial Museum, Philadelphia, Pa., January 22-26, 1951.

Marlo COIL CO. • 6135 Manchester Rd. • St. Louis 10, Mo.

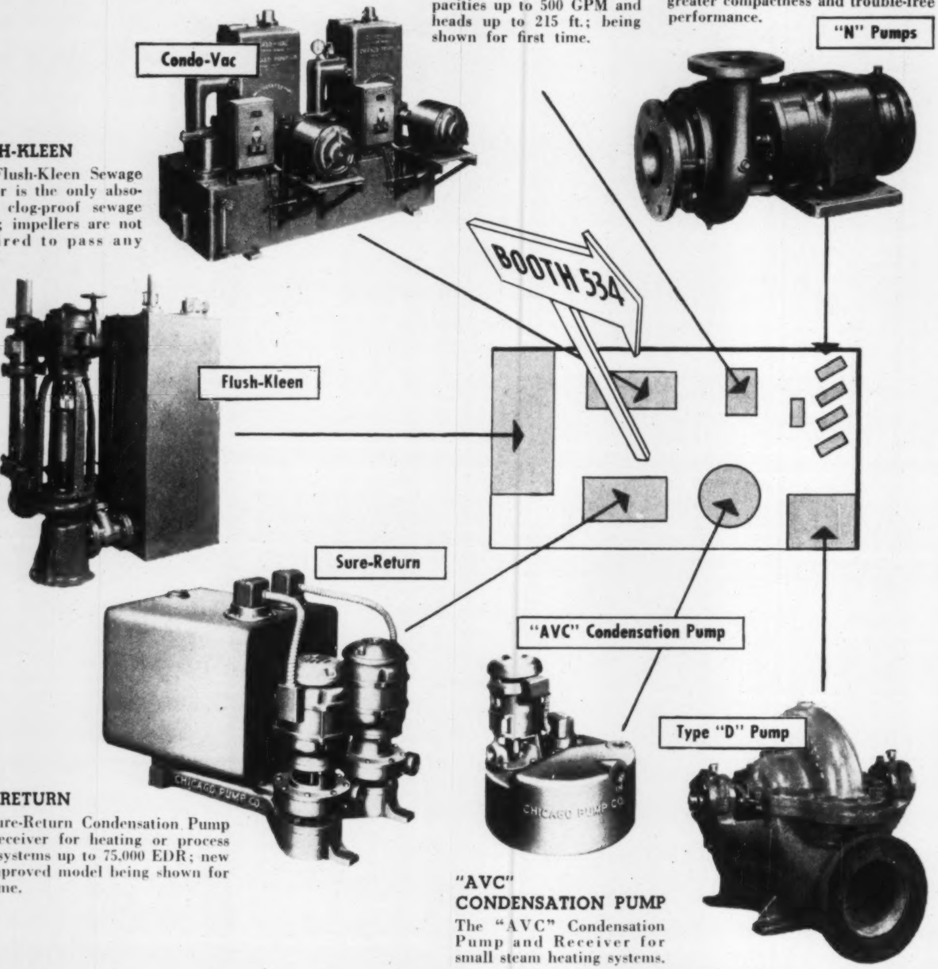
See this CHICAGO PUMP EQUIPMENT at the ASHVE Exposition

CONDO-VAC
The Condo-Vac Return Line Vacuum and Boiler Feed Pump for vacuum heating systems.

NEW "B" SERIES SIDE SUCTION PUMP
The new "B" Series line of side suction pumps for capacities up to 500 GPM and heads up to 215 ft.; being shown for first time.

"N" PUMPS
Close-coupled "N" Pumps for boiler feed, circulating, tank filling and water supply. Newly designed for greater compactness and trouble-free performance.

FLUSH-KLEEN
The Flush-Kleen Sewage Ejector is the only absolutely clog-proof sewage pump; impellers are not required to pass any solids.



SURE-RETURN
The Sure-Return Condensation Pump and Receiver for heating or process steam systems up to 75,000 EDR; new and improved model being shown for first time.

"AVC" CONDENSATION PUMP
The "AVC" Condensation Pump and Receiver for small steam heating systems.

TYPE "D" PUMP
The Type "D" heavy duty building and industrial pump for capacities from 25 to 1900 GPM and heads up to 530 ft.

CHICAGO PUMP COMPANY

BUILDING and INDUSTRIAL DIVISION

2300 WOLFRAM STREET **CHICAGO 18, ILLINOIS**

Condo-Vac, Sure Return, AVC, LVC,
Fire, House & Circulating Pumps
Pneumatic & Tankless Water Systems

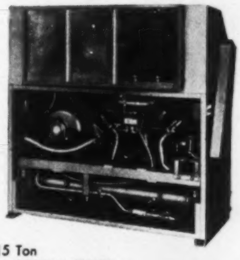
Flush-Kleen Sewage Ejectors
Little Giant & Non-Clog Bilge Pumps
Pumps for every industrial use.

Make our exhibit—in Booth 534—your headquarters throughout the convention.

Now More Than Ever

It's Curtis for PROFITS

Because Most Installations are Within the Curtis Range — 2 through 40 Tons



10 and 15 Ton Complete CENTRAL TYPE

2 through 8 Ton PACKAGED UNITS (Shipped to you completely assembled)

Evaporative Condensers, Cooling Towers and Air Handling Units

¼ H.P. through 40 H.P. Condensing Units.

With these units, you can handle any AIR CONDITIONING — REFRIGERATION or AIR MOVING JOB within this range — and when the job is sold, it *STAYS SOLD* because the QUALITY IS THERE. No corners have been cut in the manufacture of Curtis equipment — pound for pound, it's the best buy in the industry.

Curtis REFRIGERATION AIR CONDITIONING COMMERCIAL

Advertising Support A-Plenty

SATURDAY EVENING POST

TIME

NEWSWEEK

and many special consumer publications are pre-selling Curtis equipment to your prospects.

NOTE — A Curtis franchise may be open in your area. Write, giving full details.

97 Years of Successful Manufacturing

CURTIS REFRIGERATING MACHINE DIVISION

of Curtis Manufacturing Company

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Curtis

R-51-1

8 REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY

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Metallurgy

Tolerance Control

Integrity

Product Uniformity

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Engineering Service

Surface Finish

make preference for a reason your guide when you specify ball and roller bearings

Over the years, products acquire a value above and beyond their mechanical qualities—a value proved by their *acceptance* throughout industry. This is especially true of SKF ball and roller bearings, preferred by all industry for one or more of eight good reasons. So when you specify, let preference be your guide. 7200

SKF
BALL AND ROLLER BEARINGS

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.
—manufacturers of SKF *and* HESS-BRIGHT *bearings.*

MORE HEAT wherever you need it at LESS COST whenever you use it

KRITZER RADIANT COILS, INC.
EALED "FIN-TUBE" RADIANT COILS
OARD CONVECTOR
RD" RADIANT BASEBOARD
RCIAL "FIN-PIPE" COILS

WHAT'S YOUR HEATING PROBLEM?

Whatever it is we can solve it completely and economically with the sensational, high quality Kritzer Heating Coils.

- *The economical way.*
- *The efficient way.*
- *The Kritzer Way.*

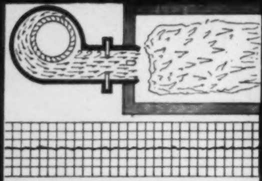
Write for these booklets now and get INFORMATION and ENGINEERING Data on this complete line of top quality Kritzer Heating Coils for your next installation whether it is Residential, Commercial, or Industrial. No obligation.

Kritzer Radiant Coils, Inc., 2905 W. Lawrence Ave., Chicago 25, Illinois

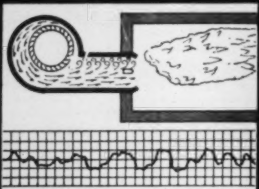
When visiting at the 10th International Heating & Ventilating Exposition in Philadelphia, Pa., stop at our Booth No. 710 in the Commercial Museum, January 22 to 26, 1951.

☐ Kritzer "Fin-Tube" Radiant Coils
☐ Kritzer Radiant Baseboard Heating
☐ Kritzer Commercial "Fin-Pipe" Coils

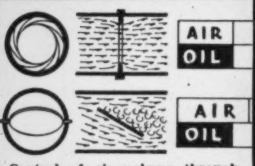
WITH *Iris Shutter* WATCH DOG OF BOILER EFFICIENCY



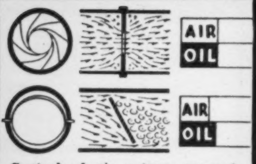
Above is pictured a typical burner WITH Iris Shutter control. Graph and flame illustration show the even flame and practically perfect control of air through your entire range.



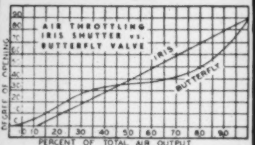
Burner without Iris Shutter shows air turbulance and uneven flame with fluxuating air volume indicating poor control.


AIR
OIL
AIR
OIL

Control of air volume through Iris Shutter versus butter-fly valve at 60% angle of opening.


AIR
OIL
AIR
OIL

Control of air volume through Iris Shutter versus butter-fly valve at 30% angle of opening. Note difference in volume control of air and oil.



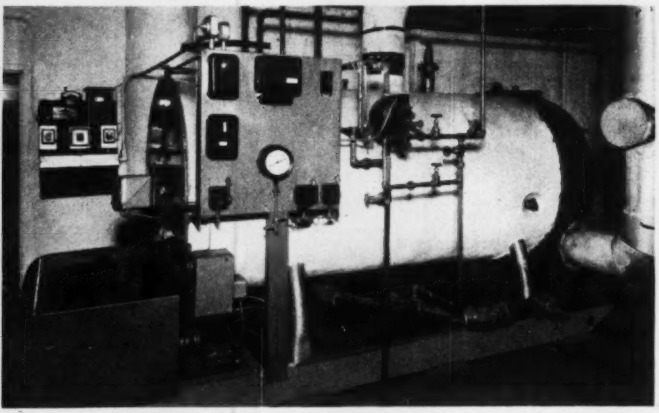
Above graph shows comparsion between Iris Shutter and butter-fly valves normally used in oil or gas burners. Note the perfect control with Iris Shutter.

STEAM-PAK

YORK YS POWER

GENERATOR

A PRODUCT OF YORK-SHIPLEY



FUEL AND LABOR SAVINGS . . . "We consider the installation of the York Steam-Pak Generator one of the finest improvements ever made to our building. The saving in fuel and the saving in cost of labor is very noticeable. It is by a large margin more efficient than our coal stoker unit that we operated for several years and which we were always pleased with." Jonas Shure, Treasurer, Wm. H. Bradford Co., Boston.

SUBSTANTIAL SAVINGS

result from

- "Steam-Pak" efficient three-pass boiler construction.
- "Steam-Pak" automatic operation with varying loads.
- "Steam-Pak" rapid steam production.

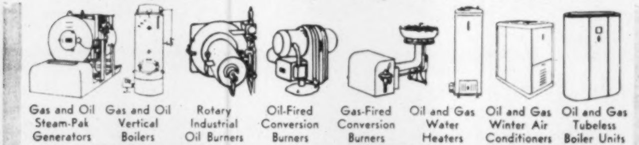
PLUS ***iris shutter*** precise metering and rapid mixing of air and fuel in "Steam-Pak" burners — see Iris Shutter explanation at left.

"Steam-Pak" Generators are built in capacities from 15 h.p. up, for low or high pressure steam or hot water, for light or heavy oil, combination gas and oil, or straight gas. Ask for Bulletin No. 37-43. See your nearest York-Shipley dealer, or write, 'phone or wire

YORK-SHIPLEY

INDUSTRIAL DIVISION

134 Jessop Place, York, Pennsylvania — Phone 7861


Gas and Oil Steam-Pak Generators
Gas and Oil Vertical Boilers
Rotary Industrial Oil Burners
Oil-Fired Conversion Burners
Gas-Fired Conversion Burners
Oil and Gas Water Heaters
Oil and Gas Winter Air Conditioners
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YORK YS POWER INDUSTRIAL DIVISION YORK YS HEAT RESIDENTIAL DIVISION

"Fact Finder" shows at a glance:

Btu loss

Surface Temperature

Efficiency

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UNIBESTOS No. 750 and No. 1200

WRITE FOR UNIBESTOS "Fact Finder" on your company's letterhead. It will be mailed to you without obligation.

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A&R Products for—

Air Conditioning • Humidifying • Dehumidifying
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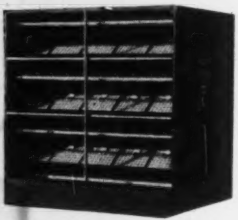
CAPILLARY AIR CONDITIONERS



A standard Factory Insulated Size 6-5 Class 1 Capillary Central Station Air Washer. Normal capacity 30,000 cfm.

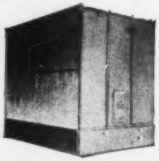
The Capillary Air Conditioner, designed to act as an air washer, dust arrester, humidifier, cooler and dehumidifier, depends on the new and far more efficient principle of dividing *both* the water and air of the system into fine streams flowing together through low resistance channels. It provides the most intimate and efficient contact between air and the cooling, moistening or cleaning fluid with unique economies in operating costs.

For most purposes, a Capillary Air Washer requires only 1/3 the volume of water at 1/3 the pumping pressure used by conventional equipment. These Capillary conditioners are available with casings and tanks factory insulated for central station air conditioning applications.

CAPILLARY UNIT CONDITIONERS are factory insulated and assembled, ready for use. They include fan, motor, drive, heating coils, Capillary Cells with suitable sprays, spray pump and mixing dampers. Units are designed for floor mounting or ceiling suspension, and can be arranged for the reception of cooling coils if required.

Capillary Air Conditioners are covered in complete detail in Bulletin G-3.

SPRAY TYPE AIR WASHERS



Standard A & R Spray Type Washer — Factory Insulated.

A & R Type S Air Washers conform to the usual basic design of spray washers, with many special features developed to insure more efficient and more dependable operation, lower maintenance costs and in most cases, lower installation costs. Unique design features include more efficient and more easily handled eliminators; collecting tanks which are much more readily cleaned; flooded entering baffles for excessively dirty air and more effective nozzle arrangement.

Type S Air Washers can be supplied with factory insulated casings and tank for central station applications.

Bulletin AW-1 provides complete description and engineering data.

SPRAYED COIL DEHUMIDIFIERS

A & R Sprayed Coil Dehumidifiers for year-round treatment of air are complete with water type or direct expansion cooling coils, sprays, circulating pump and glass mat eliminators. They are factory insulated complete units ready for speedy field assembly. Special design features insure continuous washing and cleaning of finned surfaces and easy accessibility of parts. Units can be furnished without insulation if desired.

See Bulletin SC-1 for complete data.

ARTICULATED UNITS

No matter how large the air conditioning system, A & R can supply an integrated or articulated control apparatus to meet specific needs. Where equipment is of such size that it cannot be shipped assembled, the importance of using matched and integrated central station conditioners, heating and cooling coils, fans, motors, drives, automatic dampers, fan housing and air inlet chambers, ready for assembly, cannot be over-emphasized. Over-all cost is materially reduced, while the responsibility for delivery and performance rests on one purchase order to one organization.

A & R INSULATED PANELS

These factory-produced panels consist of insulation between a metal sheet on one side and hard fiber board on the other, the three elements being laminated and cemented together under pressure. Their design includes the structural frame to form units which require only bolting together to make enclosures of any required shape for plenum chambers, air washers and many other purposes. Panels are available in widths from 3" to 48", and in lengths up to 12'. Their use insures tremendous economies in field labor

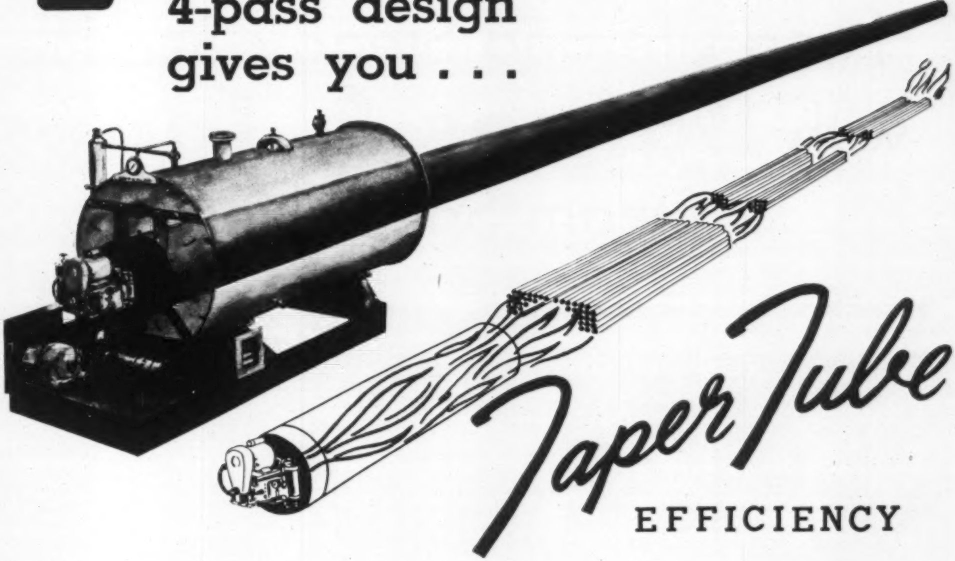
For details see Bulletin P-1.

A Typical example of A & R Panels forming a Plenum Chamber.

AIR & REFRIGERATION CORP.

475 FIFTH AVENUE
NEW YORK 17, N. Y.
ATLANTA, GEORGIA
DETROIT, MICHIGAN

HOW SUPERIOR'S 4-pass design gives you . . .



Taper Tube EFFICIENCY

The long-lived efficiency of Superior Steam Generators results from fundamentals of design which are basically sound. Superior's 4-pass, down-draft design provides a minimum of 5 sq. ft. of heating surface for each unit of horsepower rating; **and every inch of that heating surface is effective.**

WHY 4-PASS?

Theoretically (from the standpoint of heat transfer alone) the fire passes of a perfectly designed fire tube boiler would resemble a long, very gradually tapered cone surrounded by water. The large end would be sized in ratio to the volume and speed of the combustion gases so that the gases would be crowded into the tube and thus "scrub" the walls of the tube, forcing contact between fire and tube surface. As the gases give up their heat to the surrounding water (by transfer through the tube) the gases shrink in volume. The gradual taper of the tube compensates for this shrinkage, maintaining the scrubbing action which promotes efficient heat transfer.

Such a fire tube is impractical; but Superior's 4-pass design achieves the same effect. Its 4 passes are so designed that each successive pass has a lesser number of tubes (and hence a smaller area in cross section) for the passage of combustion gases. This is, in effect, **taper-tube** performance which results in the maximum practical efficiency of heat transfer . . . performance which makes it possible for Superior to guarantee **more** than 80% thermal efficiency **under field operating conditions.**

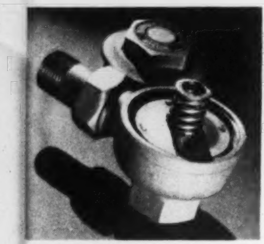
Superior Steam Generators are completely factory assembled, backed by undivided responsibility. Burn gas or oil, or both. Manufactured in 18 sizes from 20 to 600 b.h.p. for pressures up 250 p.s.i. or for hot water.

Write today for the details in Catalog **304.**

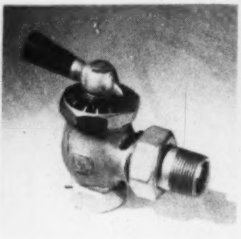
uperior ombustion ndustries, inc.

Factory Emmaus, Pa.
Executive Offices Times Tower, Times Square, New York 18, N. Y.

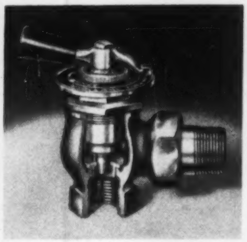
You Can Bank on Long Life and Steady Service with **Barnes & Jones** Steam Specialties



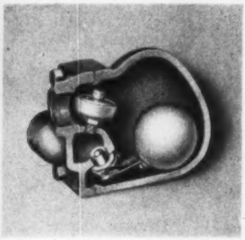
THERMOSTATIC TRAPS



MODULATION VALVES

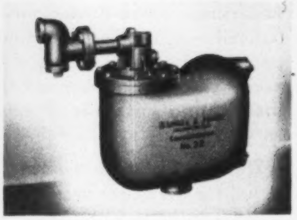


ORIFICE VALVES



F & T TRAPS

Not just one in each lot, but every B & J Thermostatic Trap, Valve and Condensator is fully checked and tested under real operating conditions before it leaves our plant. These tests are far more severe than will ever be encountered in actual service, to assure long life and trouble-free operation.



BOILER RETURN TRAPS

Does it cost us more to exercise this painstaking attention on quality and detail? Certainly. But Barnes & Jones has never been known to cut corners on its product.

When it comes to steam specialties, it will pay you well to follow the lead of the top-drawer architects and engineers who have made the B & J trademark a quality *buy*-word for more than a quarter of a century.

RADIATOR VALVES
Series F Quick Opening Type
Series K Modulating Type
Series H Adjustable Orifice

THERMOSTATIC RADIATOR TRAPS
Low, Medium and High Pressure, all sizes.

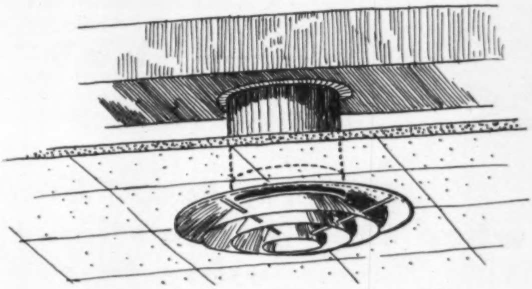
FLOAT & THERMOSTATIC TRAPS
Low Pressure & Medium Pressure.

BOILER RETURN TRAPS (Condensators)
Up to 6,000 square foot capacity.

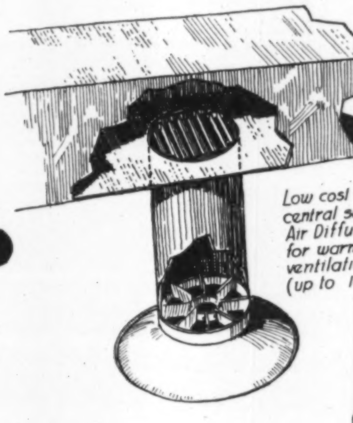
Barnes & Jones
INCORPORATED
128 Brookside Avenue, Boston 30, Massachusetts
Representatives in all principal cities

ideas for using **ANEMOSTAT AIR DIFFUSERS**

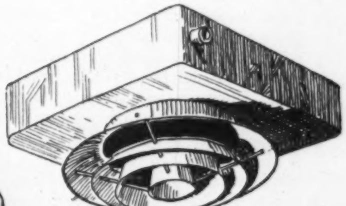
... to solve thousands of industrial heating and ventilating applications

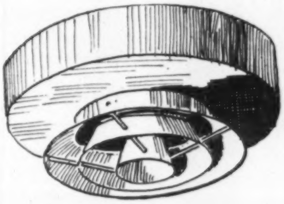


Flush ceiling mounting with duct from central system. May also be used with unit heaters located above ceiling



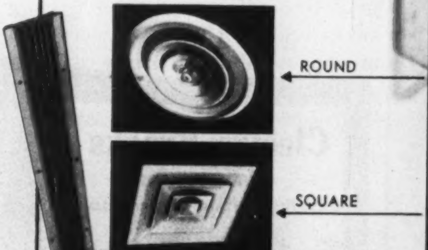
Low cost air diffusion from central systems with HU Anemostat Air Diffuser. Particularly suitable for warm air heating and ventilating, also limited cooling (up to 15°F Temp. Diff.)





Types HU-3 and HU-4 Anemostats greatly improve air distribution and may be combined with practically all sizes and makes of vertical discharge unit heaters.

ANEMOSTAT offers maximum design possibilities because only Anemostat Air Diffusers come in all these shapes



Anemostat Air Diffusers offer unlimited design possibilities. They can be used in regular, acoustical and egg crate ceilings . . . combined with all types of lighting fixtures . . . in commercial, industrial and home applications. Anemostat Air Diffusers provide uniform diffusion throughout the entire conditioned area. They eliminate harmful drafts, stale air pockets and equalize temperature and humidity. New Selection Manual contains complete application and specification data. Write for your copy.

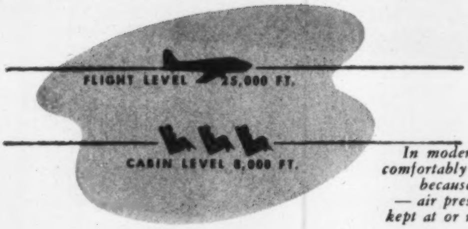
"No air conditioning system is better than its air distribution"

ANEMOSTAT®

DRAFTLESS *Aspirating* **AIR DIFFUSERS**

ANEMOSTAT CORPORATION OF AMERICA, 10 EAST 39th STREET, NEW YORK 16, N. Y.
REPRESENTATIVES IN PRINCIPAL CITIES

AC 1


FLIGHT LEVEL 25,000 FT.
CABIN LEVEL 8,000 FT.

In modern air-liners you breathe comfortably at altitudes of 25,000 ft., because your cabin is "Pressurized" — air pressure inside the plane is kept at or near normal sea level pressure.

Boilers, too, "breathe" easier when their combustion air is "pressurized" using forced draft

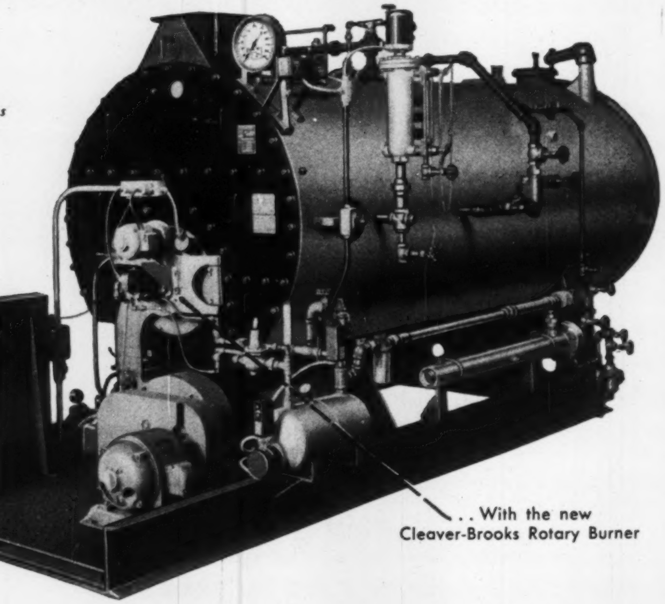
Cleaver-Brooks experience with thousands of steam boilers, of the self-contained type, has conclusively proven these operating advantages of forced draft:

- ● — because atmospheric boiler-room air is constant in temperature and therefore in density, the weight of air delivered for combustion by a forced draft fan is also constant and always gives proper air-fuel ratio (CO_2) resulting in maximum efficiency and freedom from combustion problems.
- ● — the electrical load, or power requirement, of a forced draft fan is at a minimum, because the fan handles a lesser volume of air.
- ● — low fan maintenance and longer fan life with forced draft fans since they operate with cool, clean boiler room air — no problems with high bearing temperatures and corrosion.
- ● — air is under pressure in the combustion chamber of a forced draft boiler, with no possibility of "diluting" air entering the chamber. Maximum boiler efficiencies are always attained when head plates and casings are tight.
- ● — lower initial fan cost, better space arrangement, and better appearance are gained because forced draft fans are considerably smaller.
- ● — casings for forced draft fans are cool — require no insulation — contribute to safer operation and cooler boiler rooms.

Forced draft is one of many reasons why you get a greater return from your investment in a Cleaver-Brooks boiler — a boiler of foremost quality in every detail and with many immediate and long-range cost-saving features. Cleaver-Brooks self-contained boilers are available for oil, gas, combination oil and gas firing — 15 to 500 hp., 15 to 250 lb. p.s.i.

CLEAVER-BROOKS COMPANY
367 E. Keefe Ave., Milwaukee 12, Wis.

Write for a Cleaver-Brooks Steam Boiler Catalog



Cleaver-Brooks
STEAM BOILERS
the first and finest of their class

. . With the new Cleaver-Brooks Rotary Burner

COOLER
WARMER
THE FULTON SYLPHON CO.
KNOXVILLE, TENN.
Sylphon

DIAL COMFORT

...with Sylphon Control

Sylphon Control 928-C. Convenient manner of adjustment. Connecting tube length as required. Suitable for steam pressures up to 15 lbs.; other types available for pressures up to 75 lbs.

● Put Sylphon Temperature Regulators to work in office buildings, plants, aboard ships—and they maintain temperature *exactly* as wanted. They do it thriftily, too—rooms are never too hot, never too cold.

No. 928-C, pictured here, is just one of the family of Sylphon "comfort regulators." It's ideal for modulating control of air temperature in ducts. Simple and compact, it is highly sensitive to slightest temperature changes.

Its packless valve eliminates service problems. No exposed operating mechanism. Especially suited for installation in ordinarily inaccessible locations. Self-powered . . . sturdily built to operate faithfully for years.

Find out how No. 928-C, or other Sylphon Regulators, can help assure controlled comfort at *all* times. For complete details, write for Catalog AH-50.

FS

FIRST WITH BELLOWS

Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON

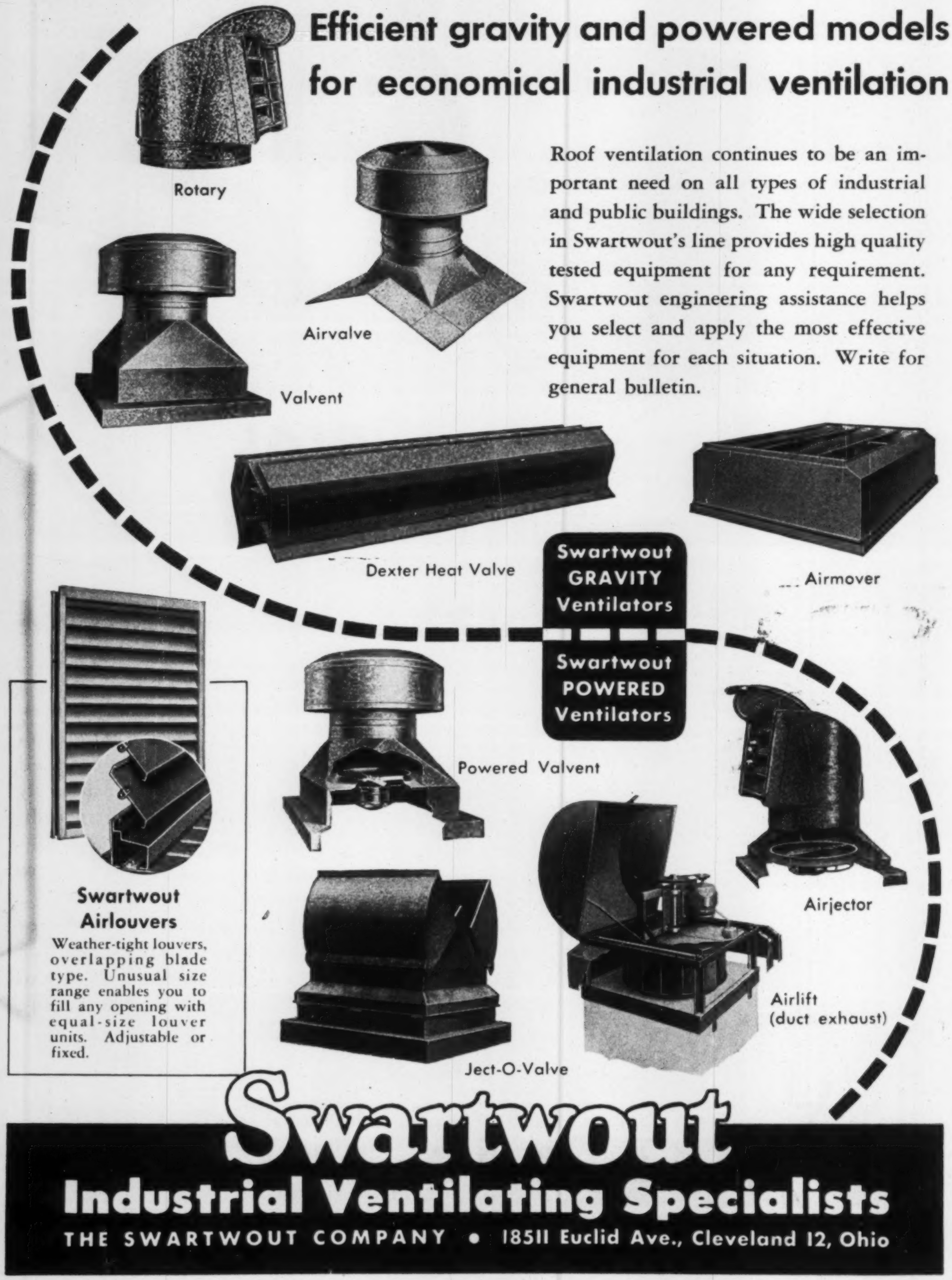
DIVISION

ROBERTSHAW-FULTON CONTROLS CO., KNOXVILLE 4, TENN.

Canadian Representatives, Darling Brothers, Montreal

The Swartwout Roof Ventilator Line

Efficient gravity and powered models for economical industrial ventilation


Rotary
Airvalve
Valvent
Dexter Heat Valve
Swartwout GRAVITY Ventilators
Airmover
Swartwout POWERED Ventilators
Powered Valvent
Airjector
Airlift (duct exhaust)
Ject-O-Valve

Roof ventilation continues to be an important need on all types of industrial and public buildings. The wide selection in Swartwout's line provides high quality tested equipment for any requirement. Swartwout engineering assistance helps you select and apply the most effective equipment for each situation. Write for general bulletin.

Swartwout Airlouvers

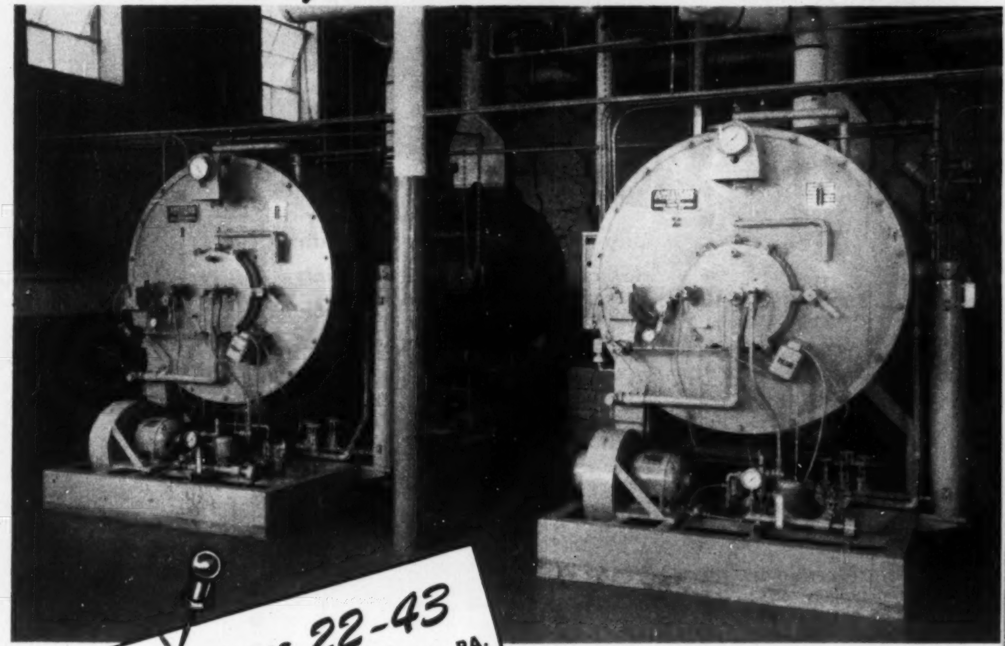
Weather-tight louvers, overlapping blade type. Unusual size range enables you to fill any opening with equal-size louver units. Adjustable or fixed.

Swartwout

Industrial Ventilating Specialists

THE SWARTWOUT COMPANY • 18511 Euclid Ave., Cleveland 12, Ohio

What's Your STEAM *Problem?*



VISIT BOOTHS 22-43
COMMERCIAL MUSEUM – PHILADELPHIA, PA.
JANUARY 22-26, 1951
For the Answer!

AMESTEAM GENERATOR

A Compact, Self-Contained Unit — Automatic, Efficient, Quick Steaming

- **AUTOMATIC OPERATION** — from a cold boiler to full operating pressure in only a few minutes — just press the button.
- **ECONOMICAL OPERATION** — guaranteed 80% efficiency. Fuel consumed only as steam is used. Combination Units available for quick change-over to either oil or gas to meet changing fuel availability.
- **ACCESSIBILITY** — rear flue cover and baffle easily removed for cleaning and inspection. All equipment installed in easy-to-get-at locations.
- **NO "EXTRAS" NEEDED** — in addition to the minimum equipment usually furnished with Units of this type, our standard unit for over 15 pounds design steam pressure regularly includes:

Condensate Tank • Blow-off Valve • Feed Pump Unit • Injector • Main Steam Valve • Necessary Refractories • Insulation and Metal Jacket

Write for Bulletin 1011-C

Gives complete data on the AMESTEAM GENERATOR to meet your needs — oil, gas or oil-gas combination — 10 to 500 h.p., 15 to 200 lbs., as desired. WRITE TODAY!

AMES IRON WORKS
BOX 2001, OSWEGO, N. Y.
Builders of Better Boilers since 1848
Manufactured under License in Canada by VOLCANO, Ltd., Montreal, P. Q.

COMPACT • YET EFFICIENT

ALIKE IN PERFORMANCE
. . . BUT DIFFERENT IN PURPOSE

BUILT FOR A SPECIFIC JOB

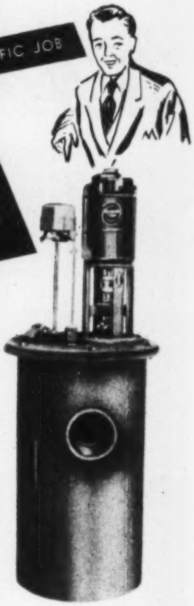
PEAK PERFORMANCE

Type "CV" VERTICAL PUMP, for limited space installation, has capacities ranging from 500 to 10,000 sq. ft. E.D.R. and pressures of 10-20 pounds.

Designed to conform with specific needs—the Skidmore line includes: Condensate pumps for below level returns, vertical pumps where space is limited and capacity requirements are small. Vacuum or turbine type pumps were best suited to conditions.

Day in and day out, you can depend on Skidmore heating pumps for economical operation with PEAK PERFORMANCE — under all types of conditions.

Other advantages in a Skidmore pump is the experience of sound engineering, backed by over a quarter of a century in pump manufacturing . . . plus the fact that each type of Skidmore Pump is designed to suit a specific purpose and installation. That is why you are assured of PEAK PERFORMANCE when a Skidmore Pump is specified.


Type "UV" PUMP DESIGNED FOR BELOW LEVEL RETURNS —Capacities ranging from 2,000 to 40,000 E.D.R.

Write today for complete engineering data and specifications on any one of these, or information on the complete line of Skidmore Heating Pumps. All are efficient and economical to maintain.

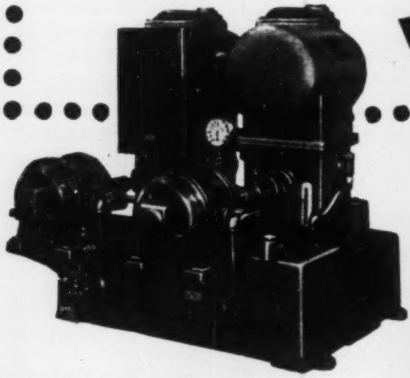
ALWAYS DEPENDABLE

SKIDMORE PUMPS

ST. JOSEPH, MICHIGAN

ECONOMICAL TO OPERATE

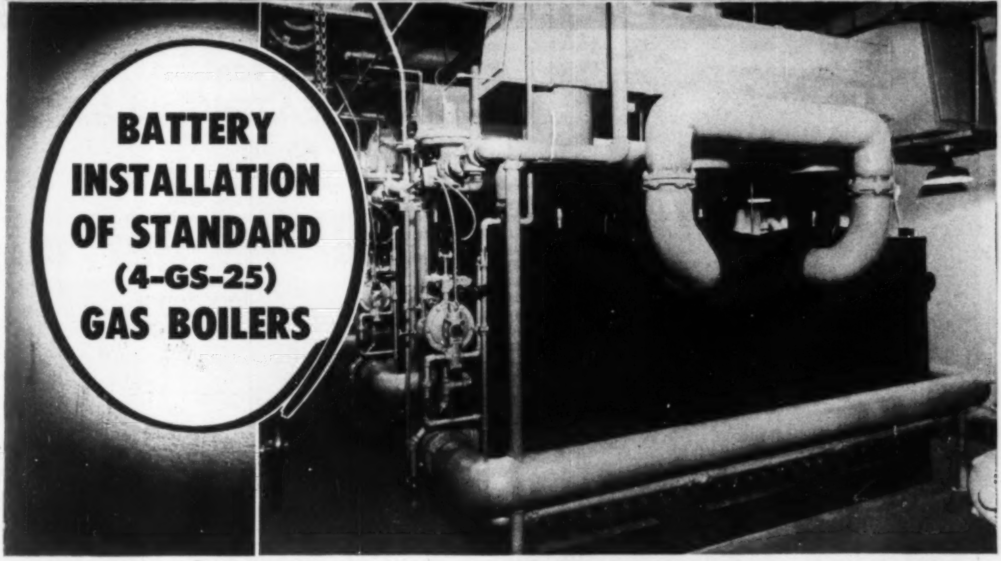
Type "TM" HIGH Pressure Turbine PUMP. Pressures up to 150 pounds, and boilers up to 250 H. P.


DUPLEX VACUUM PUMP—Made in single and duplex units with ratings of 5,000 to 100,000 sq. ft. E.D.R.

Type "HS" PUMP—Capacities of 1,000 to 65,000 sq. ft. E.D.R. and discharge pressure from 10 to 75 pounds.

AMERICAN-Standard

First in heating . . . first in plumbing



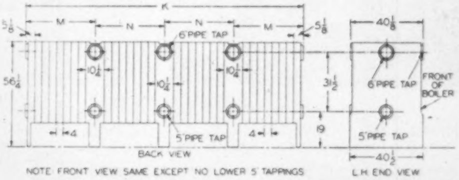
BATTERY INSTALLATION OF STANDARD (4-GS-25) GAS BOILERS

STANDARD GAS BOILERS continue to be the choice of architects, engineers and management for important installations. The battery of three 4-GS-25's shown above is in one of California's newest and busiest office buildings. The comfort and health of its occupants demand a heating system that will provide a dependable supply of warmth throughout every foot of this big building . . . and do it with a minimum operating and maintenance cost.

Standard Gas Boilers come in a wide range of sizes to provide effortless heating in larger homes, apartments, office buildings, hospitals and various commercial and industrial buildings. They can be used in battery installations in larger buildings to provide an extremely flexible heat source through the operation of one or more units, thus giving greatly increased economy during mild weather, as well as perfect comfort in the coldest weather.

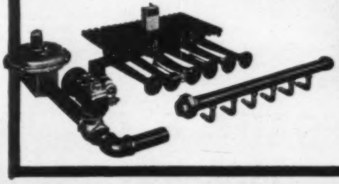
Standard Boilers and other top quality heating equipment by American-Standard are sold through selected wholesale distributors to heating and plumbing contractors. **American Radiator & Standard Sanitary Corporation,** P. O. Box 1226, Pittsburgh 30, Pa.

An important feature of larger Standard Boilers is the number of flow tappings provided. For example, type 4-GS-25 has six 6", and type 4-GS-33 (section assembly of which is diagrammed below) has eight 6" flow tappings.



NOTE: FRONT VIEW SAME EXCEPT NO LOWER 5" TAPPINGS

The Standard gas fired cast iron sectional boiler is precision-machined to facilitate quick and easy assembly. Individual sections and parts will pass through boiler room doors without difficulty. For time and labor saving installation, controls, valves and control piping are factory-assembled as far as possible.



LOOK FOR THIS MARK OF MERIT

Serving home and industry

AMERICAN-STANDARD · AMERICAN BLOWER · CHURCH SEATS · DETROIT LUBRICATOR · KEWANEE BOILERS · ROSS HEATER · TONAWANDA IRON

THERM-O-TILE

Reg. U. S. Pat. Off.

the Underground Steam Conduit

During 1949 and 1950 we showed photographs in HEATING, PIPING & AIR CONDITIONING of numerous large New York City housing projects employing Therm-O-Tile. Above are two more not previously shown — the James Weldon Johnson Houses on top and the Marcy Houses below.

IDEAL FOR
CENTRAL HEATING PLANTS
AS IN

Airplane Factories
Airports
Automobile Plants
Chemical Plants
Church Groups
Colleges
Cotton Mills
Factories
Gas Plants
Greenhouses
Hospitals
Housing Projects
Military Establishments
Municipalities
Paper Mills
Penal Institutions
Plastics Plants
Public Utilities
Rayon Factories
Rubber Factories
School Systems
Steel Plants
Textile Mills
Universities
Woolen Mills
Etc.

PERMANENT PROTECTION

Therm-O-Tile Conduit permanently houses, supports, and insulates underground mains of central heating plants or pipe distribution systems. It is designed and produced by a firm of Insulation Engineers and Contractors with more than thirty-five years' experience in this specialized work.

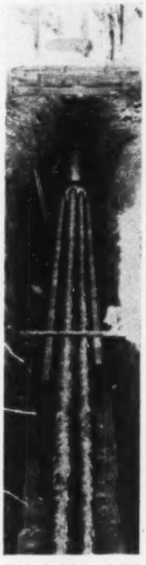
Therm-O-Tile eliminates the weaknesses of former types of split tile and concrete conduits. Installation has been simplified. A more durable and efficient conduit system is the result.

EFFICIENCY

Due to the sealed air chambers in the tile envelope, plus the perfectly dry insulation space, a thermal efficiency of 90% or better is easily obtained with either a sectional pipe covering or filler type of insulation. See photos at right and left of these two types.

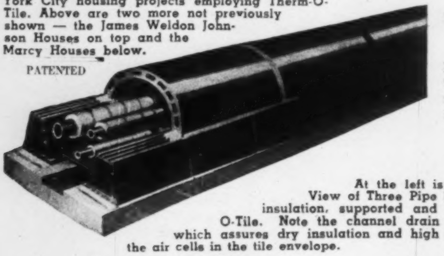
SPECIFICATIONS FURNISHED

Recommendations, estimates of cost, and complete specifications for the conduit and insulation will be furnished by Therm-O-Tile Engineers on any underground pipe line project upon request.



Typical Therm-O-Tile Installation Job Using Filler Type Insulation.

PATENTED



At the left is shown an Assembly View of Three Pipe Lines, using sectional insulation, supported and protected by Therm-O-Tile. Note the channel drain in the concrete base which assures dry insulation and high efficiency. Note, too, the air cells in the tile envelope.

Therm-O-Tile Conduit is Sold and Installed by Johns-Manville Construction Units in all Principal Cities.

H. W. PORTER & CO., INC., — REID HAYDEN, INC.

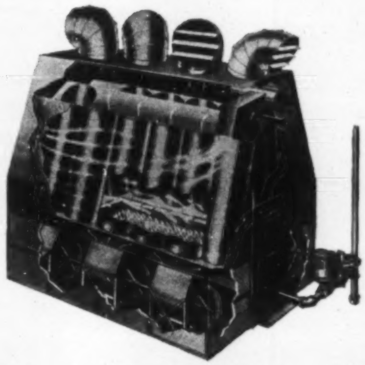
INSULATION ENGINEERS & CONTRACTORS
NEWARK—BALTIMORE—RICHMOND—CHARLOTTE

CHECK *this* CHART

Furnace Number	Heating Surface	For Building Heat Loss Btu	Maximum Capacity Btu	Blower CFM	Firing Rates 1000 Btu		
					Oil GPH	GAS C.F.H.	Stoker Lbs./Hr.
8075	280	483,000	725,000	8850	7.0	900	80
8100	320	596,000	893,000	10900	8.5	1,120	100
8125	360	720,000	1,080,000	13200	10.5	1,350	125
8150	440	850,000	1,275,000	15600	12.0	1,600	150
8175	480	960,000	1,440,000	17500	14.0	1,800	175
8200	600	1,150,000	1,725,000	21100	16.5	2,150	200
8250	750	1,440,000	2,160,000	26400	20.5	2,700	250

Use prefix "U" in front of furnace number when referring to Direct-fired Space Heaters

for the CAMPBELL HEATER you want!

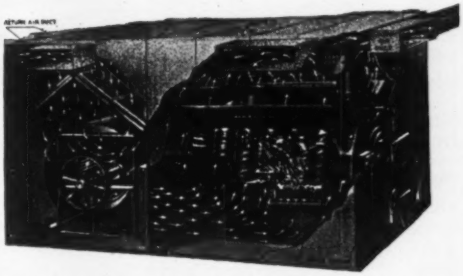


DIRECT-FIRED SPACE HEATERS

Use these Campbell units for big space-heating jobs. Available for oil, gas and stoker firing in capacities up to 2,160,000 BTUs per hour. These extra heavy welded steel heaters are built to deliver long, dependable service and exceptional fuel economy. Available in all sizes shown on chart.

8000 SERIES HEATERS

These outstanding heaters make it easy and practical to use warm air heat in large, multi-room buildings. Large, silent blower assures quick distribution of heat. Easily adapted for summer air conditioning. Available for all fuels in sizes shown on above chart.



SPECIAL UNITS FOR DRYING & PROCESSING

We specialize in the design and construction of special units for drying and processing operations. Let us submit our recommendations for a dryer to meet your specifications. Oil or gas-fired up to 14,000,000 BTUs.

CAMPBELL HEATING COMPANY

3143 Dean Avenue • Des Moines 17, Iowa

MULTI-VENT (T. M. REG.)

Low Velocity Air Diffusion CEILING PANELS

Multi-Vent Panel Air Diffusers completely concealed; installed in ducts above suspended acoustical ceilings.

YALE & TOWNE MFG. CO.
Philadelphia Division

The Ballinger Associates, Architects & Engineers. Turner Construction Co., General Contractor. Riggs-Distler & Co., Inc., Mechanical Contractor.

*See SWEET'S Arch. & Eng. Files or: Write for detailed literature and the name of the Multi-Vent sales engineer in your vicinity.

VISIT OUR EXHIBIT
Booth 15
10th International
Heating & Ventilating Exposition
Philadelphia, Jan. 22-25

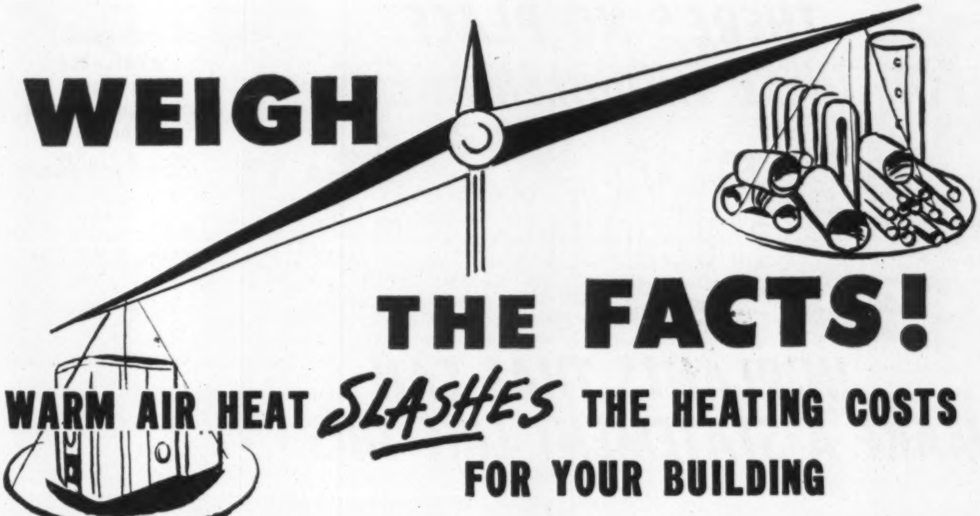
for COMPLAINT-FREE AIR CONDITIONING

Multi-Vent insures truly complaint-free air conditioning, because only Multi-Vent Panel Diffusers can provide perfect overall air distribution, through large perforated ceiling areas, entirely by ***pressure displacement*** — completely free from BLOW or ***high velocity injection.*** BLOW is the direct source of all draft hazards and is responsible for the most serious installation, balancing, maintenance and adjustment problems.

Multi-Vent is the best buy for virtually every type of commercial or industrial building, new or old where true comfort or where uniformity and accurate control of air movement, temperature, and humidity is the primary objective.

In addition the use of Multi-Vent Panel Diffusers makes possible substantial savings in the basic air conditioning equipment, installation and maintenance costs.

MULTI-VENT DIVISION **THE PYLE-NATIONAL COMPANY**
1373 N. KOSTNER AVE., CHICAGO 51, ILL.



WEIGH THE FACTS!

WARM AIR HEAT *SLASHES* THE HEATING COSTS FOR YOUR BUILDING

Save money . . . save space . . . save steel with a Jackson & Church Warm Air Furnace. Just glance at these savings realized by builders who compared and chose warm air heat . . .

J-C Dealer Saved $4000 for Contractor

1,355,000 Btu Heat Loss

J-C Dealer Saved $3500 for Road Commission

1,600,000 Btu Heat Loss

J-C Dealer Saved 40% for Bowling Alley

1,089,000 Btu Heat Loss

J-C Dealer Saved $13,000 for Church

1,000,000 Btu Heat Loss

There's no secret to these savings. Your nearest Jackson & Church dealer will gladly show you how you, too, can cut your heating costs. Or, write directly to us. Remember, our engineering department is at your service to assist with your heating plans.

Weigh the facts and join the happy J-C customers who have received full measure . . . dollar for dollar . . . in comfort and attention-free heating, *saved money* and what's more precious . . . space and steel.

SEE OUR CATALOG IN SWEET'S

. . AMERICA'S LARGEST AND MOST COMPLETE WARM AIR HEATING LINE . . .

J·C JACKSON & CHURCH CO.

SAGINAW, MICHIGAN

WORK WELL DONE SINCE '81

THERE'S NO PLACE FOR THESE TROUBLEMAKERS • •

MAINTENANCE
POOR REGULATION
REPLACEMENTS
SPOILAGE
STOPPAGES
FAILURES

IN PLANTS THAT CAN MAKE A STATEMENT LIKE THIS • •

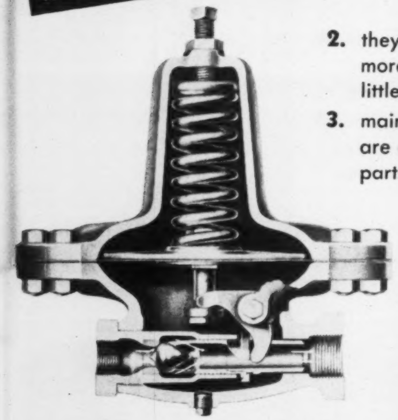
"We use your Streamlined '1000' Valves on the following equipment:

Heating Systems
Solution Heaters
Plating Tanks
Degreasing Machines
Hot Water Heaters

CASH STANDARD TYPE 1000 *Streamlined* PRESSURE **REDUCING VALVE**

"We use them:

1. because they hold close delivery pressure control.
2. they don't get gummed up, so we get more and better production with very little lost time.
3. maintenance cost is very low—the guts are cheap—old parts come out and new parts go in easily with little time lost."



•

ITS ASPIRATOR AND STREAMLINED FLOW WORK TO YOUR BENEFIT IN THESE 12 WAYS . . .

1. Maximum Capacity when needed most. 2. Accurate Pressure Control under toughest working conditions. 3. Trouble-free Service. 4. Smooth Operation. 5. Tight Closure. 6. Accurate Regulation. 7. Speedier Production Results. 8. Elimination of Failures. 9. Constant Delivery Pressure. 10. Cost Saving Operation. 11. No Spoilage. 12. Practically zero in maintenance costs.

CASH STANDARD
CONTROLS . . .
VALVES

A. W. CASH COMPANY
DECATUR, ILLINOIS

•

BULLETINS AVAILABLE ON OTHER CASH STANDARD VALVES

Send for them

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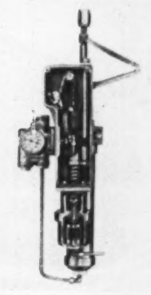
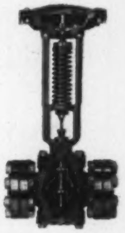
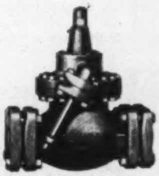


Bulletin 963 features the CASH STANDARD Type 100 Series of Super-Sensitive Controllers — various types for automatically operating valves, dampers, rheostats, stokers, pulverizers, fans, and other apparatus. 16 pages filled with descriptions and applications.



Bulletin 968 features the CASH STANDARD Type 34 Pressure Reducing Valve — direct operated — direct acting for handling steam, hot water, cold water, air, oil, brine—and most liquids and gases except some injurious chemicals. Illustrates and describes the different styles available and tells about their applications. Three pages of capacity charts.



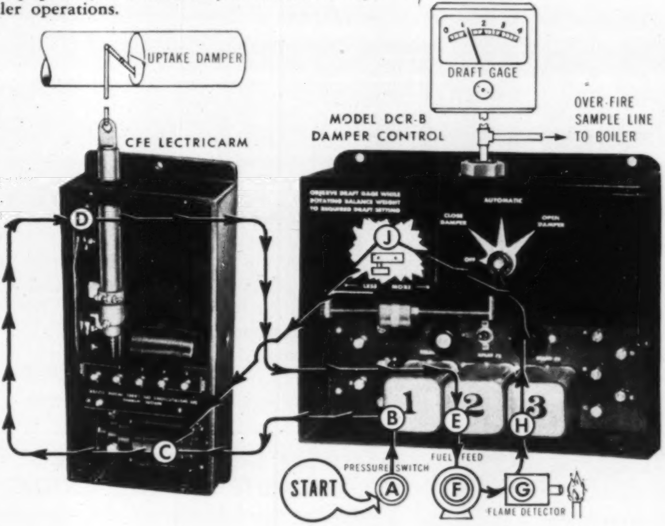
Bulletin 956 features the CASH STANDARD Type 4030 Back Pressure Valve — designed to automatically maintain a constant pressure in the evaporator corresponding to a constant temperature desired. Shows an Ammonia and Freon Gas Capacity Chart based on ABSOLUTE pressures.

YOU CAN GET

Automatic Sequence Control at Low Cost with

CLEVELAND DAMPER CONTROL

The initial cost of this equipment is so low that most installations pay for themselves, in fuel savings alone, in less than a year. One compact unit contains all the elements for safe, automatic electrical control from over-fire draft, providing proper draft and proper timing to assure perfect combustion at all times. Applicable to oil, gas or stoker-fired boilers. Designed for use with C.F.E. indicating gages (draft, air pressure and flue temperature) and "Lectricarm" drive unit. In addition to fuel savings, CLEVELAND DAMPER CONTROL reduces smoke, soot and fly ash, prolongs life of boiler equipment, and materially increases safety of boiler operations.



HERE'S HOW IT WORKS: Steam pressure calls for heat, closing pressure switch (A). Signal goes to No. 1 relay (B), which energizes "Lectricarm" (drive unit) motor (C) to open uptake damper. When damper is open, with full draft established, drawbar actuates limit switch (D), signaling No. 2 relay (E), which then energizes fuel feed mechanism (F) to start firing. On oil or gas burners, a flame detector (G) signals No. 3 relay (H) when safe flame is established. No. 3 relay (H) transfers draft control to diaphragm operated switches (J), to establish automatic draft modulation by controlling reversible "Lectricarm" motor (C) linked to uptake damper, maintaining the predetermined most efficient setting. When pressure switch (A) is satisfied on oil or gas-fired boilers, No. 3 relay signals "Lectricarm" motor (C) to close damper until more heat is required. On stoker installations modulated draft continues until heat is again called for.

For further information, request Bulletin DCR-B or write for name of nearest agent

TYPICAL INSTALLATIONS

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Addressograph-Multigraph
Amer. Vitrified Prds. Co.
Armour & Co.
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Omar Baking Co.
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Richman Bros. Co.
Sharon Steel Corp.
Sherwin-Williams
Southern Mills Corp.
Talon, Inc.
Tinnerman Products
Viking Air Conditioning
Ward Baking Co.
Welch's Grape Juice

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Baptist Orphanage of Va.
Meyer Memorial Hospital
St. Clair Convent
St. Vincents Hospital
Woodbine Colony (N.J.)

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CLEVELAND FUEL EQUIPMENT CO.
FOR EFFICIENCY AND ECONOMY

CLEVELAND FUEL EQUIPMENT CO.

Complete Line of Combustion Instruments and Controls

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Co[illegible]ete Line of Registers and Grilles

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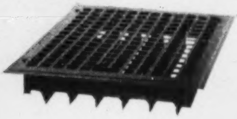
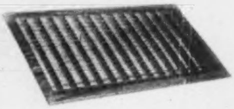
A-J

WALL REGISTERS
Available with Lock Attachment

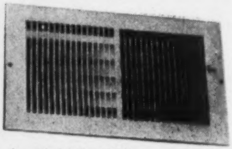
▼



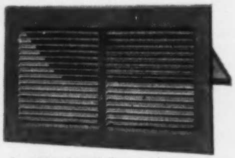
FLOOR GRILLES
▼ **Close Mesh**



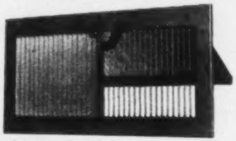
REGISTERS FOR FORCED AIR
Available with Matching Grilles



▲ **Multiple Valve**

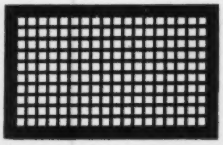


▲ **Single Valve**

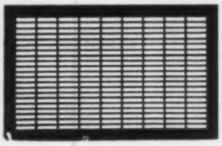


▲ **Single Valve**

ARCHITECTURAL GRILLES

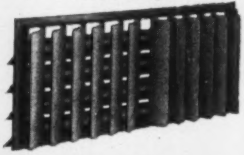


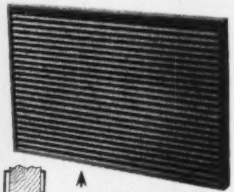
Plain Lattice Designs



Slotted Designs

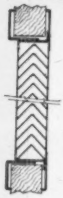
DIFFUSERS
▼ **Double or Single**





▲

NO-VISION GRILLES
Door or Partition

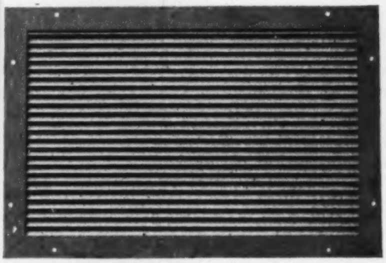


← **Auxiliary flange frame, slide fit telescoping.**

VISIT OUR DISPLAY Booth #436

10th International Heating and Ventilating Exposition in Philadelphia, Jan. 22-26

A-J Introduces the New NO-SITE NO-LITE GRILLE
For Dark Rooms, Laboratories, and Military Uses



#75B—This new grille will be demonstrated at the 10th International Heating and Ventilating Exposition, Jan. 22-26, Philadelphia, Pa. Write today for specifications and prices.

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Here's real peace of mind! He knows that fire from a short circuit, a stray spark, a forgotten cigarette or spontaneous combustion can't destroy his investment in materials, equipment and buildings. His plant is protected with modern, approved C-O-TWO Fire Protection Equipment.

For instance, with a C-O-TWO Combination Smoke Detecting and Fire Extinguishing System you have a 24 hour a day automatic fire watchman. The first whiff of smoke in a protected area sounds an alarm. Then fast, clean, non-damaging, non-conducting carbon dioxide blankets the fire, putting it out in seconds, before it spreads and causes extensive damage ... no lingering odors, no water damage with carbon dioxide.

There are areas in your plant that particularly need C-O-TWO fast, positive fire protection: record vaults, store rooms, spray booths, dip tanks, solvent baths, electrical equipment enclosures, lift trucks, pump rooms, especially anywhere there's danger of flammable liquid or electrical fires. The longer you wait to adequately protect these areas, the greater are the chances of a costly fire cutting into your profits.

Whatever your fire protection problem, let an expert C-O-TWO Fire Protection Engineer help you in planning complete and up-to-date fire protection facilities now. Write us today ... tell us about your particular fire hazards, our experience is at your disposal ... no obligation of course.

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MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT
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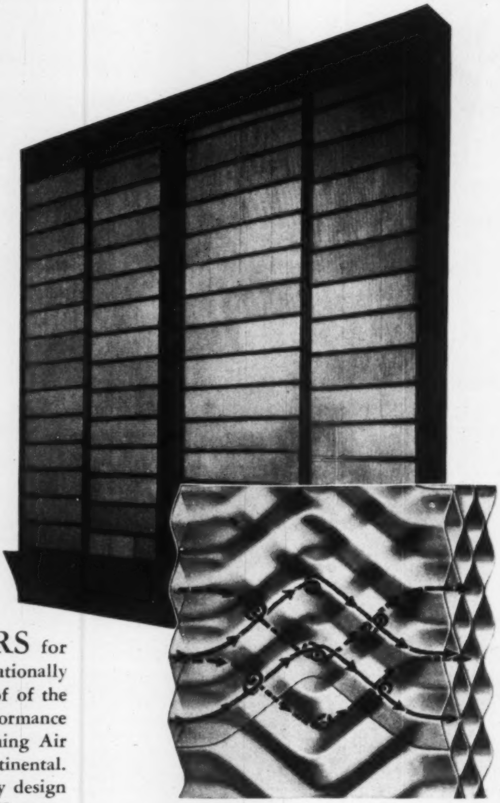
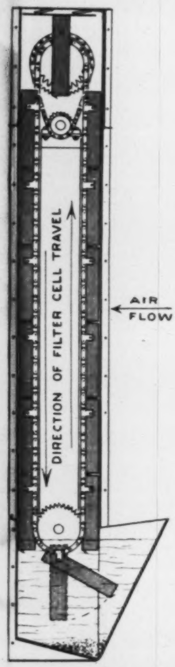
CONTINENTAL *proves* "TOPS" *in air-cleaning* PERFORMANCE

Independent tests by A. S. H. V. E Code Methods prove Continental Air Filters provide an exceptionally high cleaning efficiency.



Listed by Underwriters' Laboratories, Inc.



REPEAT ORDERS for Continental installations from nationally important users are the best proof of the wide acceptance and excellent performance of the new Automatic Self-Cleaning Air Filter developed and built by Continental. In just four years its revolutionary design has won nationwide admiration. Here are the reasons:

REVOLUTIONARY NEW FILTER MEDIA

Skillfully engineered honeycomb filter media (patented) has large non-clogging air passages, yet extracts air-borne dust thoroughly by splitting the airflow into 2300 separate whirling streams per square foot of filter surface. Thus it combines higher efficiency with *constant* low resistance to air flow.

FERRIS WHEEL ROTATING ACTION

Filter cells pivot like cars on a ferris wheel as they pass from the front to the back filter curtain. There is no reversal in the direction of air flow through the filter media. As a result, *dirt cannot be blown off into the clean-air stream.*

POSITIVE SELF-CLEANING ACTION

As each filter cell moves down into the oil reservoir, it soaks in a semi-horizontal position for 30 minutes or more. The cell then automatically drops to a vertical position. This patented action forces a surge of oil through the filter which effectively flushes out accumulated dust and thus *preserves the low initial resistance of the filter.*

WRITE FOR PERFORMANCE DETAILS

Before you specify or buy, ask us for complete data on this Continental Automatic Self-Cleaning Air Filter.

USE THE COUPON

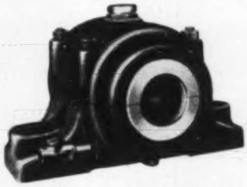
GENTLEMEN: Please send the following:
Bulletin No. 201-C ☐ Sample of Ezwash Air Filter Media ☐
NAME ____________________
FIRM ____________________
STREET ____________________
CITY ____________ STATE ________

CONTINENTAL AIR FILTERS, Inc.
P. O. BOX 1647 • LOUISVILLE 1, KY.

SEE OUR DISPLAY AT A. S. H. V. E. SHOW, PHILADELPHIA—BOOTH 218

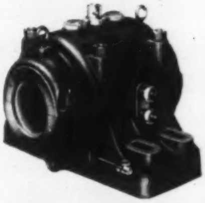
QUIET DODGE BEARINGS

THE MOST COMPLETE LINE FOR FAN AND BLOWER SERVICE



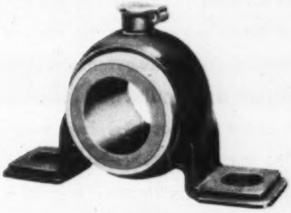
SLEEVOIL PILLOW BLOCK

A precision-built, ring-oiling babbitted bearing, self aligning and exceptionally quiet in operation. Special seals prevent oil leakage and keep dirt out of the bearing.



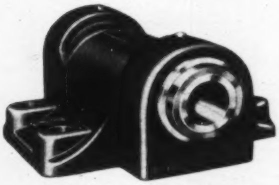
WATER-COOLED SLEEVOIL

Specially designed for applications where elevated temperatures are encountered. Dodge Sleevoil bearings combine quietness with exceptional load carrying capacity; are available in shaft sizes from 1-11/16" to 8".



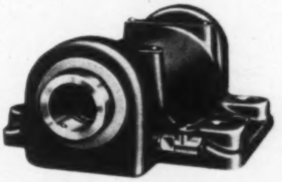
DODGE BRONZOIL

Capillary bronze bushing has capacity of one-third its volume in oil. Reservoir with close fitting wick around bushing provides ample lubrication. Oil resistant grommets available for noise isolation. Sizes 1/2" to 1-1/4".



BALL BEARING PILLOW BLOCK

Single row, deep groove ball bearings. Inner race extended to form sleeve which carries shaft. Piston ring seals retain lubricant, exclude dirt. For arrangement No. 2. Shaft sizes 15/16" to 2-1/4".



BRONZE BUSHED PILLOW BLOCK

Designed for arrangement No. 2 installations. Two bronze bushings of high lead content and T section rings, sealed against dirt. Composition rings inside thrust collar prevent oil leakage. For shaft sizes 15/16" to 2-3/16".

CALL THE TRANSMISSIONEER

your local Dodge distributor, for information about the entire Dodge line of bearings for fan and blower service. Look for his name in the Classified Telephone Directory under "Power Transmission Equipment." Or write to the factory.

DODGE MANUFACTURING CORPORATION
MISHAWAKA • INDIANA

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FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY,
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..in the Crowell-Collier Buildin

Styled in the best traditions of contemporary architecture . . . designed throughout for utmost efficiency . . . this modern home of the world-known publishers of *Collier's*, *Woman's Home Companion*, and *The American Magazine* is the latest addition to the New York skyline . . . and like so many other important air conditioned installations from coast to coast, Tri-Flex and Aerovane Grilles and Registers were selected to insure maximum, flexible control of air delivery . . . to meet the most exacting requirements of performance.

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You get these **5 BIG ADVANTAGES** with Ingersoll-Rand MOTOR PUMPS

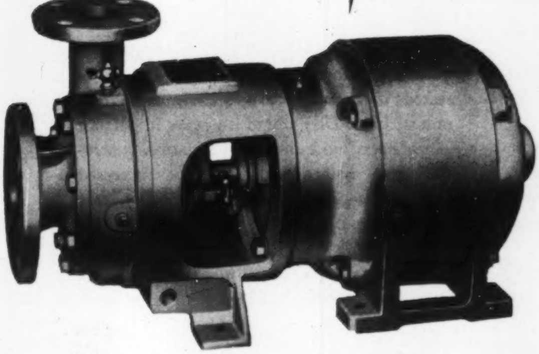
1 **COMPACT DESIGN**
Ingersoll-Rand Motorpumps are ruggedly built with motor and pump combined in one unit with a single shaft. Saves space; eliminates vibration.

2 **OPERATE IN ANY POSITION**
These pumps operate efficiently whether mounted horizontally, vertically or at any angle. This means that it can be bolted to floor, wall, ceiling, tank or column, whichever is most convenient.

3 **OVERSIZE SHAFT**
This insures minimum shaft deflection, a smooth-running impeller, and eliminates many packing troubles. Shaft protected against wear and corrosion by shaft sleeve.

4 **DEEP STUFFING BOX**
All heavy-duty Ingersoll-Rand Motorpumps have space for 5 or more rings of packing and a sealing gland. A needle valve provides exact control of the sealing liquid. Mechanical Seals are available on integral hp units and standard on fractional hp units.

5 **OVERSIZE BEARINGS**
Larger radial and thrust capacity than bearings in a standard motor. Also protected from dust and dirt by cartridge type housings.



Available in sizes from ¼ to 40 hp. Capacities from 10 to 1800 g.p.m. Heads up to 600 ft.

MOTOR PUMP

Get in touch with us for more complete information or for any help you need in solving your pumping problems.

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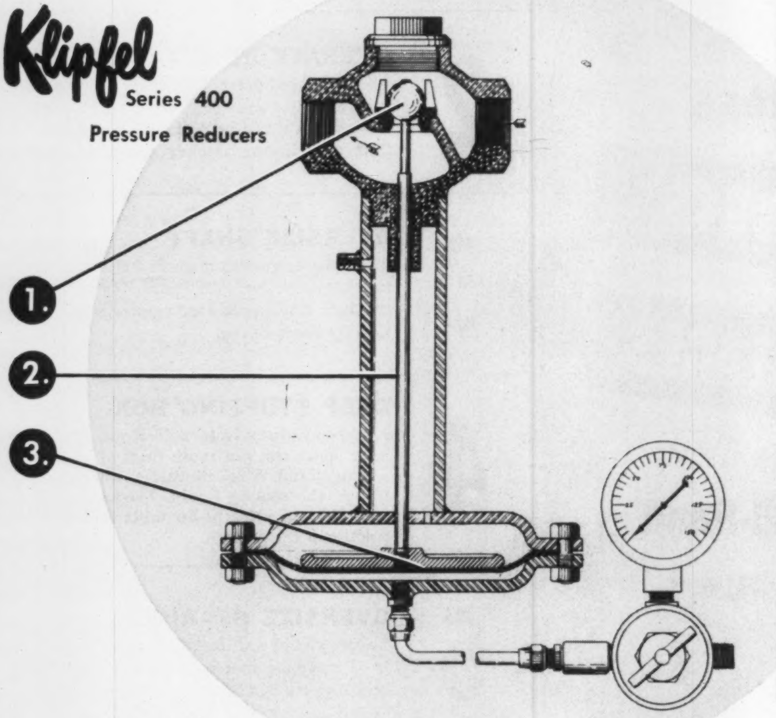
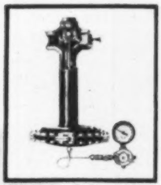
only 3 moving parts

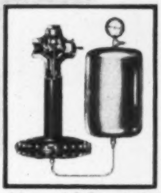
Klipfel
Series 400
Pressure Reducers





No. 432 with constant air supply—for quick, easy adjustment.

No. 431 with air dome—for isolated installations.



No. 430 with separate air tank—for variable ambient temperature.

Accurate low-cost regulators . . .

FOR longer service with negligible maintenance, operating parts are reduced to just three, inner valve, stem and diaphragm, in the Klipfel 400 Series air-loaded Pressure Reducing Valves. In addition, these 400 Series Valves provide exceptionally close regulation for an unusually low initial cost.

The stainless steel ball inner valve is a perfect sphere, extremely hard and well guided to close to a tight seat. Easily reseated if necessary . . . is self-cleansing and non-sticking. Diaphragm is always in balance . . . no stress, no bursting. Regulation is accurate and easily controlled. For increased safety, flow automatically shuts off in case of diaphragm failure.

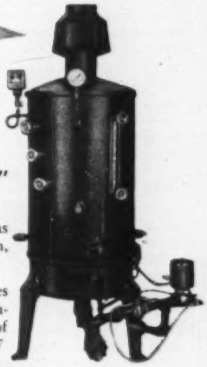
For full data on the Klipfel 400 Series Valves, for steam, air, water or gas, write Dept. C-1 for Bulletin No. 148.

Klipfel VALVES INCORPORATED
DIVISION OF HAMILTON-THOMAS CORP., HAMILTON, OHIO

the Answer to that steam problem may be one of these "steamboilerplants"

For every purpose, from neighborhood press shop to giant industrial process, there's a gas-fired or oil-burning, vertical or horizontal McKee Automatic "Steamboilerplant" to provide fast steam economically. Only a few of the many types are shown here.

Desirable Territory open for Engineering Sales Representatives.



Type "D" McKee "Steamboilerplant" Gas-Fired; Gas-Designed

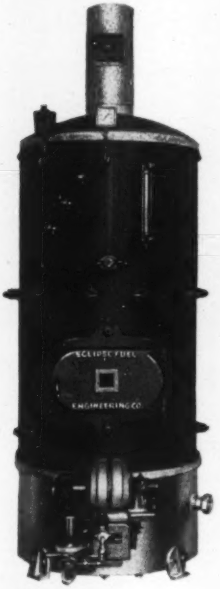
This complete factory-built unit has many unusual features; rapid circulation, complete combustion, seamless shell.

Available in sizes ¾ to 7 H.P., pressures up to 500 lbs., Standard and Push-Button, five models to suit all types of applications. Write for Bulletin A-107

McKEE AUTOMATIC

"Steamboilerplants"

"complete package" ready to install and use



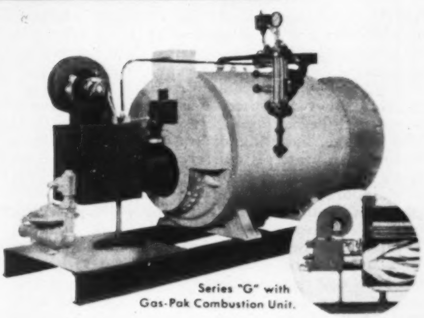
Oil-Burning McKee Automatic Steam Boiler

Where either gas or oil-burning unit is preferred, this complete unit is recommended. Has automatic steam pressure control, automatic starting and flame failure protection. Write for Bulletin A-1000. Available in sizes 3 to 75 H.P. and pressures up to 250 lbs.

New Gas-Fired Super-Matic Scotch Boiler

This Super-Matic "Steamboilerplant" has demonstrated its economy and highly efficient operation in all types of industrial installations. A "Complete Package", ready to connect up and operate.

Available in nine different sizes, 12 to 100 H.P., **for gas, for oil or for combination gas and oil,** all in accordance with ASME code requirements. Write for Bulletin A-104.



Series "G" with Gas-Pak Combustion Unit.

Let us help you on unusual steam boiler applications

REPRESENTATIVES IN ALL PRINCIPAL CITIES

Eclipse Fuel Engineering Company
839 South Main Street, Rockford, Illinois

McKee Eclipse

5374

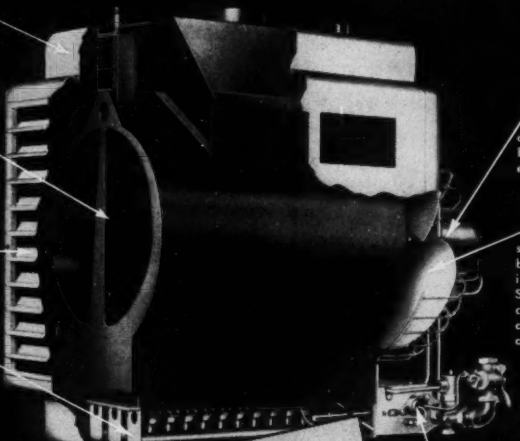
THE MOST COMPLETE LINE OF GAS-FIRED INDUSTRIAL EQUIPMENT

BEAUTY LINE STYLING — Blends perfectly with any surroundings. Finished in rich, dust-resisting Ivory baked enamel. Acceptable in office, retail store, restaurant or factory.

FREE FLOW HEAT EXCHANGER — Heavy welded steel; gas tight. Large area and streamlined surface gives rapid transfer of heat. No baffles to impede flow. Requires no cleaning.

ADJUSTABLE LOUVERS — Horizontal or vertical louvers available. Control of direction of heat is simple.

SUPER COMBUSTION CHAMBER — Completely new, all-steel super combustion chamber assures the maximum in heating satisfaction and economy. Equipped with special alloy stainless steel "dual-flame" burner tips.



RUGGED FAN MOTOR — Smooth starting, heavy duty, rubber cushioned motor built for trouble-free, efficient service.

POSITIVE CIRCULATION FAN — Quiet, smooth running fan assembly is easily accessible for inspection and servicing. Scientifically designed—statically and dynamically balanced for vibrationless operation.

PROTECTIVE SAFETY CONTROLS — Basoid Safety Pilot shuts off gas to main burner and pilot in event of pilot outage. Overload control protects heater against danger of excessive internal temperatures. Operates on *all* types of gases.

THESE EXCLUSIVE *Humphrey* FEATURES ASSURE THE BEST IN GAS HEAT!

Increase your profits and gain assurance of customer satisfaction with Humphrey Unit Heaters.

Sell complete heating comfort . . . trouble free service . . . economical performance. Your profits grow when you sell Humphrey Unit Heaters.

Clean, economical heat is furnished instantly and to any point needed. These compact, self-contained heaters are equipped with a powerful fan to circulate heat in remote areas. Cold corners are eliminated.

The economical Humphrey Unit Heaters are saving money for users everywhere. Completely automatic, needs little care or maintenance. No fuel storage, handling or waste. Suspended from ceiling, the heater is entirely removed from floor space leaving entire floor for productive facilities.

Humphrey Unit Heaters are a complete heating plant in themselves. A gas supply line, electric current for fan motor and provision for venting is all that is needed. Eliminates steam and water lines, boilers and fireman.

Ideal for heating stores, restaurants, factories, auditoriums, warehouses and countless other buildings.

Sell economical heating . . . complete comfort . . . controlled heat circulation. Humphrey Gas Unit Heaters give you these advantages. Write today for additional information.

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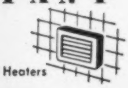
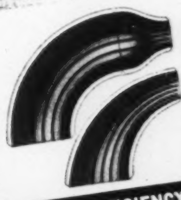
Radiantfires

Circulators


Wall Heaters

Unit Heaters

Ladish Reducing Elbows

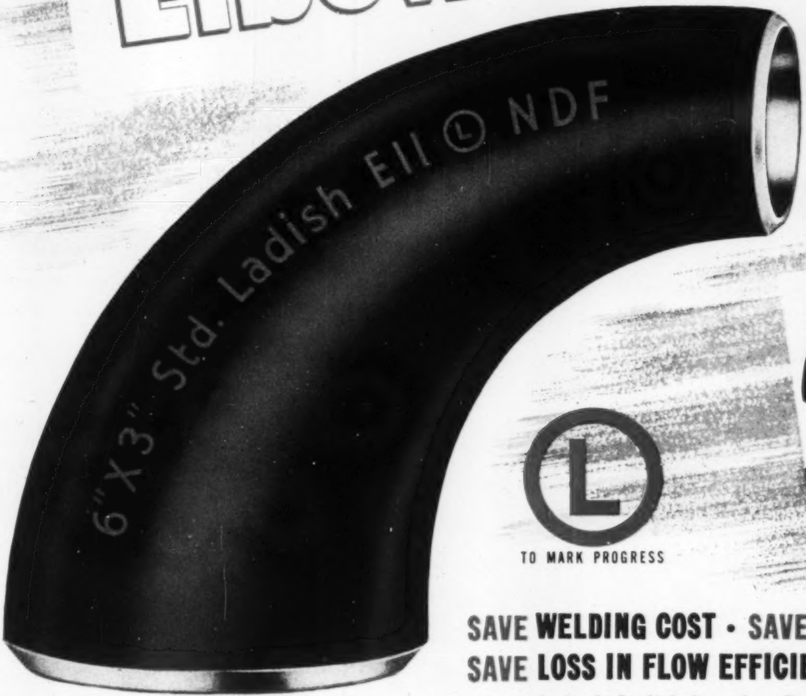


FLOW EFFICIENCY

Uniform, gradual reduction in diameter from face to face of the fitting, plus full, effective center-line radius reduces turbulence and assures maximum flow efficiency.

SEAMLESS DESIGN

The first practical Seamless Reducing Elbow, this Ladish development for which a patent is pending, is formed in one piece from high quality seamless tubing at forging temperature.



PATENT PENDING

ONLY
ONE
WELD

EASY TO INSTALL

Welding and installation time is reduced by these Ladish Reducing Elbows which eliminate the need for handling and welding an additional fitting.

TO MARK PROGRESS

SAVE WELDING COST · SAVE AN EXTRA FITTING
SAVE LOSS IN FLOW EFFICIENCY · SAVE SPACE

A single Ladish Seamless Reducing Elbow eliminates the 90° Elbow and Reducer formerly needed to change direction of flow and reduce pipe size simultaneously. This effects considerable installation economies . . . saving one weld and one fitting at each location . . . with the added advantage of accomplishing the reduction in less space. In addition, the smooth, gradual reduction in diameter of Ladish Reducing Elbows offers less resistance to flow.

Ladish Reducing Elbow Size Range—2" x 1" through 12" x 6" in Standard and Extra Strong Weights. Seamless through 6" x 3".

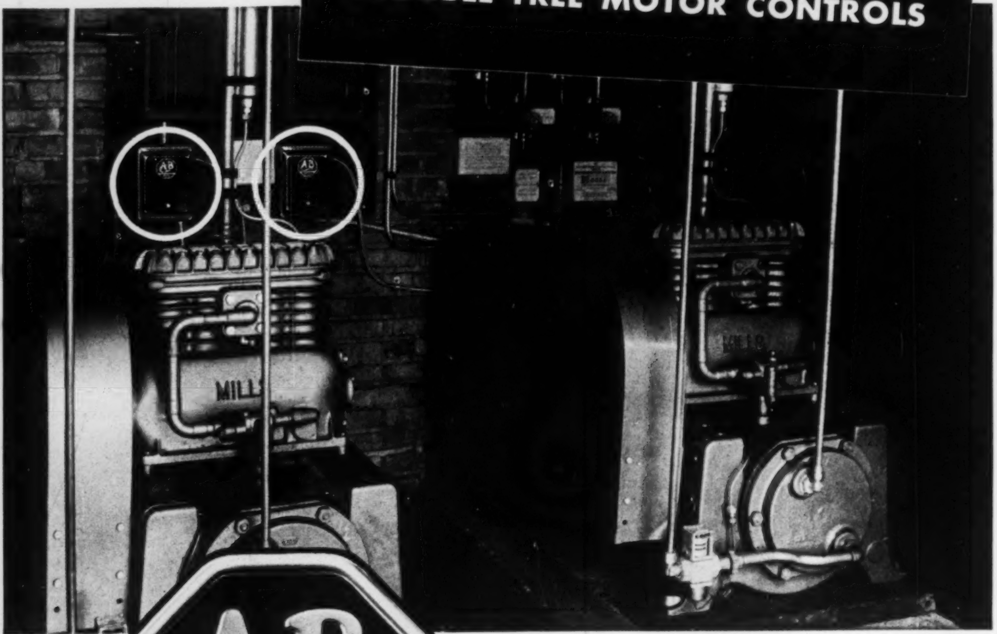
THE COMPLETE *Controlled Quality* FITTINGS LINE
PRODUCED UNDER ONE ROOF...ONE RESPONSIBILITY

LADISH CO.

CUDAHY, WISCONSIN
MILWAUKEE SUBURB

District Offices: New York • Buffalo • Pittsburgh • Philadelphia • Cleveland • Chicago
St. Paul • St. Louis • Atlanta • Houston • Tulsa • Los Angeles • Havana • Toronto

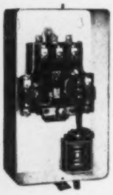
MILLS REFRIGERATION UNITS
equipped with
ALLEN-BRADLEY TROUBLE FREE MOTOR CONTROLS



Two to five hp Mills Refrigeration Units equipped with Allen-Bradley Bulletin 709 Solenoid Starters.

A-B
Quality

A-B SPECIAL REFRIGERATION CONTROL UNIT



Allen-Bradley has a broad line of air-conditioning and refrigeration controls; pressure and temperature controls; manual, automatic and combination starters; and special refrigeration panels. This special unit consists of a high pressure cutout and starter in one enclosure.

Why are Allen-Bradley starters so popular for refrigeration and air-conditioning service? . . . because they are trouble free. Only ONE moving part. No pivots, pins, or bearings to corrode or stick . . . no jumpers to break. You install them . . . and forget them!

No contact maintenance . . . Allen-Bradley patented silver alloy contacts never need cleaning, filing, or dressing.

Dependable overload relays . . . Allen-Bradley thermal relays are accurate and always dependable . . . even after long service.

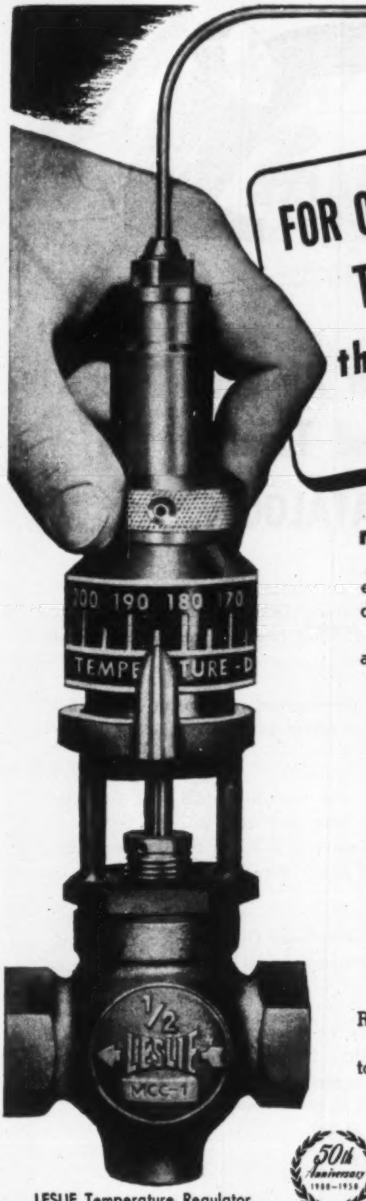
The Allen-Bradley trademark stands for millions of trouble free operations.

Allen-Bradley Co.
1335 S. First Street, Milwaukee 4, Wisconsin.

ALLEN-BRADLEY SOLENOID MOTOR CONTROLS

FOR QUICK, EASY and DEPENDABLE TEMPERATURE SETTINGS...

the NEW LESLIE Calibrated Dial is the Answer!



LESLIE Temperature Regulator
Class MCC—1 *(with Calibrated Dial)*

THE new **CALIBRATED DIAL** now available on Leslie Class T and Class M type Temperature Regulators provides quick, easy, and dependable temperature settings. A simple turn of the dial to the temperature desired is all that is needed.

This calibrated dial adds the following features to those which already make Leslie Temperature Regulators a great value:

★ **TIME SAVING**—*Just turn the dial to desired setting—no need to wait for equipment to heat up to find out if setting is correct.*

★ **SAFE**—*Avoids costly overheating caused by guess setting.*

★ **RUGGED**—*Designed for production line use where frequent dependable readjustments are necessary for process work.*

★ **SIMPLE**—*Fits in place of standard adjusting sleeve. No complicated linkages or gages to go out of order or add friction.*

Calibrated Dials are easily installed on Class T and Class M Regulators already in service.

LESLIE engineers are available by phone, mail or personal calls to give recommendations on your temperature regulation problems.

SEND FOR — copy of
Temperature Regulator Bulletin No. 464B

50th Anniversary 1900–1950

Lowest Overall Cost per Operating Year

Look for LESLIE REGULATORS under "Valves" or "Regulators" in your classified telephone directory in the following cities where LESLIE factory trained engineers are located:

Albany, N. Y
Albuquerque, N. M.
Atlanta, Ga.
Baltimore, Md.
Beaumont, Tex.
Birmingham, Ala.
Boston, Mass.
Bridgeport, Conn.
Buffalo, N. Y.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio
Denver, Colo.
Des Moines, Iowa.
Detroit, Mich.
Duluth, Minn.
Greensboro, N. C.
Greenville, S.C.
Houston, Texas
Kansas City, Mo.
Kingsport, Tenn.
Los Angeles, Calif.
Louisville, Ky.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
Mobile, Ala.
Monroe, La.
New Orleans, La.
New York, N. Y.
Orlando, Fla.
Philadelphia, Pa.
Pittsburgh, Pa.
Ponca City, Okla.
Portland, Ore.
Providence, R. I.
Richmond, Va.
Rochester, N. Y.
Rutherford, N. J.
San Francisco, Calif.
Savannah, Ga.
Seattle, Wash.
St. Louis, Mo.
Syracuse, N. Y.
Tucson, Ariz.
Wilkes-Barre, Pa.
Wilmington, Calif.
Youngstown, Ohio
Montreal, Que., Can.
Toronto, Ont., Can.
Vancouver, B.C., Can.
Bruxelles-Forest, Belgium

ESTABLISHED 1900
LESLIE
CO.

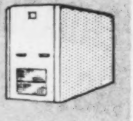
718

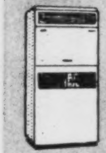
237 Grant Avenue, Lyndhurst, New Jersey

PRESSURE REDUCING VALVES • PRESSURE CONTROLLERS
FLOATLESS LEVEL CONTROLS • PUMP GOVERNORS • TEMPERATURE REGULATORS
SELF CLEANING STRAINERS • AIR HORNS • STEAM WHISTLES

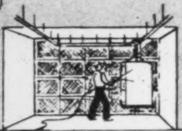
THERE'S AN RP
Air Filter for:

FORCED WARM
AIR FURNACES

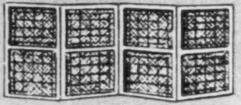




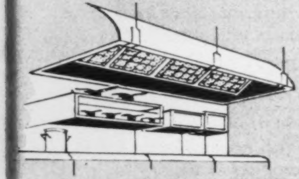
UNIT
AIR CONDITIONERS



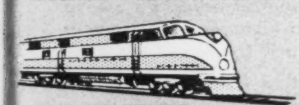
PAINT SPRAY BOOTH



CENTRAL SYSTEM
FILTER BANKS



KITCHEN GREASE CANOPIES



ENGINE INTAKE

SPECIAL
PURPOSE
DESIGNS

*Tell us your
Air Filter
needs and
specifications*

Whatever Your Air Filter Needs — You'll Find Them In The RP CATALOG

Yes, you can answer every customer Panel Air Filter requirement with the R-P filter line . . . and help yourself to handsome profits, too!

If you have a filter service program, you can cut costs in half with R-P Fiber Self Seal filters with the "Save the Frame" feature.

Any of your customers who want to handle their own filter service can find exactly what they need in the R-P line. It ranges from the inexpensive E Z Kleen for unit air conditioners through rugged heavy duty industrial air filters for any panel application.

And also . . . in the R-P line are Grease Filters for kitchen canopies, Paint Arrestors and special purpose designs of all types.

Yes, there's an R-P filter for every purpose . . . and your R-P Catalog provides complete, handy information on sizes and specifications. Write for your copy . . . and let the complete R-P line show the way to extra volume, extra profits.

Write **RESEARCH PRODUCTS CORP., Madison, Wis., U. S. A.**

RP . . . PRODUCTS OF RESEARCH

WASHABLE AND REPLACEMENT AIR FILTERS • GREASE FILTERS
EVAPORATIVE COOLER MATERIALS

Moore INDUSTRIAL

AXIAL FLOW FANS AND BLOWERS

QUIET — SLOW SPEED — DIRECT DRIVE — DEPENDABLE

42" VENTILATING FAN
Series 16

MOORE fans quietly move large volumes of air. Rugged construction assures long life and maintenance-free service.

Slow speed, permanently greased ball bearing motor is rubber mounted in dirt proof hub.

Manufactured of steel for general applications, or of Monel Metal or Stainless Steel for corrosive fumes. Separate motor ventilation is provided when made for corrosive atmospheres. **WRITE FOR COMPLETE LITERATURE.**

VENTILATING FANS

(Vaneaxial)

For exhausting smoke, fumes, vapors, dust and for fresh air supply. Widely used by packing houses, paper mills, sugar refineries, textile mills, bleacheries, laundries, foundries, dairies and factories.

THE MOTOR IS IN THE HUB—IT'S DIRECT DRIVE

VENTILATING FAN SPECIFICATIONS
Series 16—(16" Hub)

STANDARD MODELS ¾ HP.—60 Cy.—3 Ph., 2 Ph., or 1 Ph.					HIGH CAPACITY MODELS 1¼ HP.—60 Cy.—3 Ph., or 2 Ph.				
Fan Diameter	Speed R.P.M.	No. of Blades	Air Del'y C.F.M.	List Price Steel	Fan Diameter	Speed R.P.M.	No. of Blades	Air Del'y C.F.M.	List Price Steel
36"	375	12	11,000	$320.00	36"	570	5	15.000	$320.00
42"	375	5	15,000	340.00	42"	570	4	18.000	340.00
48"	375	4	18,000	360.00	48"	370	6	21,000	400.00
54"	375	4	21,000	380.00	54"	370	6	25.000	420.00
60"	375	3	25.000	400.00	60"	370	5	29.000	440.00

Capacities listed are for free air delivery

36"
PRESSURE
BLOWER
Class 2000

AXIAL FLOW PRESSURE BLOWERS

(Vaneaxial)

THE MOTOR IS IN THE HUB—IT'S DIRECT DRIVE

MOORE Class 2000 pressure blowers are used in duct systems with filters and coils for industrial ventilation and other large industrial air moving applications. They are manufactured of steel, monel or stainless for corrosive atmospheres—Custom assembled without extra cost for maximum efficiency at volume and pressure desired.

The Specifications Listed Below Show Capacities for Various Sizes.

SERIES 16 PRESSURE BLOWERS (16" Hub)

BLOWER DIAMETER	SPEEDS RPM	MOTOR HP	NUMBER OF BLADES	VELOCITY FPM	NORMAL RANGE CFM	MAXIMUM TOTAL PRESSURE (VP + SP)
32"	380 to 1710	¾ to 25	2 to 8	1000 to 4300	4.000 to 20.000	7.20" wg.
36"	380 to 1710	¾ to 15	2 to 8	1000 to 4300	6.000 to 25.000	2.80" wg.
42"	380 to 1140	¾ to 15	2 to 8	1000 to 3600	8.000 to 30.000	2.80" wg.
48"	380 to 1140	¾ to 15	2 to 8	1000 to 3600	11,000 to 40.000	2.80" wg.
54"	380 to 855	¾ to 11	2 to 8	1000 to 3100	14.000 to 45.000	1.60" wg.
60"	380 to 855	¾ to 11	2 to 8	1000 to 3000	18.000 to 55.000	1.60" wg.
SERIES 24 PRESSURE BLOWERS (24" Hub)						
48"	285 to 1140	4 to 60	2 to 8	1000 to 5700	9,000 to 55.000	4.25" wg.
54"	285 to 855	4 to 45	2 to 8	1000 to 4700	13.000 to 60.000	3.76" wg.
60"	285 to 855	4 to 45	2 to 8	1000 to 4600	16.000 to 75.000	3.76" wg.
72"	285 to 684	4 to 36	2 to 8	1000 to 3650	25.000 to 90.000	2.40" wg.
84"	285 to 570	4 to 32	2 to 8	1000 to 2900	35.000 to 100.000	1.60" wg.
96"	285 to 488	4 to 21	2 to 8	1000 to 2600	45.000 to 120.000	1.20" wg.

Above capacities are based on 70° standard air and 60 cycle speeds. Two or more blowers may be connected in tandem or series for higher pressures. Regular motor production includes 220, 440 and 550 volt, 60 cycle, 3 phase. Two-speed motors and other current characteristics available. For larger diameters, Class 7000 Blowers may be furnished in diameters up to 24 ft.

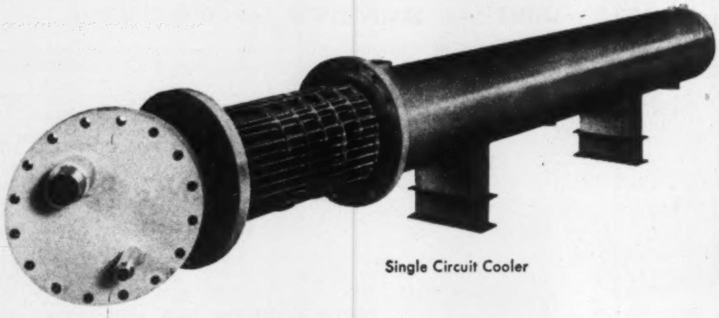
Consult the nearest representative or write direct. Your inquiry will receive prompt attention. Representatives in the following cities: Charlotte, N. C.; Chicago; Dallas; Greenville, S. C.; Los Angeles; Indianapolis; Kansas City; Milwaukee; Minneapolis; New Haven; New York; Philadelphia; Pittsburgh; Portland, Ore.; Salt Lake City; St. Louis; San Francisco; Tulsa; Washington.

THE *Moore* COMPANY

810 S. MISSOURI
MARCELINE, MO.

FREON COOLERS...

HIGH TRANSFER RATE AT LOW PRESSURE DROP



Single Circuit Cooler

The **p·k** Dry Expansion Type Freon Cooler is specially designed to cool water and other fluids for air conditioning, refrigeration, process and industrial cooling applications with maximum heat transfer and minimum pressure drop. The entire cooling element is removable from the shell. Each of the seamless drawn cooper tubes is free to expand and contract independently of the others ... assuring complete elimination of temperature and expansion strains.

Standard construction is No. 18 BWG copper tubing. Carbon steel, Stainless, cupro nickel, silicon bronze or other alloys are available for your individual needs. Our Engineering Department will recommend specific materials to meet them.

Meets ASME Code requirements.

Two Circuit Cooler

Our new 12-page catalog gives complete details. Send for it. It will be a valuable reference and it may well introduce you to major economies.

7273

p-k *70 years of heat transfer experience assures you of superior design and construction*

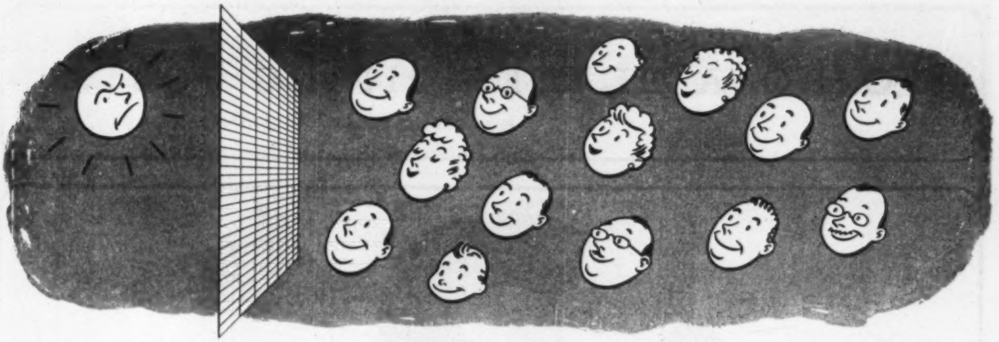
Dry Expansion Freon Coolers • Freon Condensers • Flooded Type Freon Coolers • Instantaneous Water Heaters • Suction Line Heat Exchangers • Ammonia Coolers • Ammonia Condensers • Storage Water Coolers • p-k Balance Loaders* • p-k Slug Eliminators* • Allied Shell and Tube Heat Exchanger Equipment

* Patented

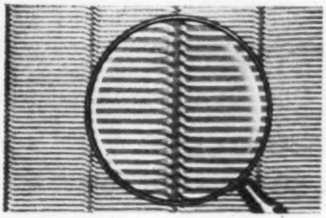
the **Patterson-Kelley Co. Inc.**

73 Burson Street, East Stroudsburg, Pa.

101 Park Avenue New York 17	Railway Exchange Building Chicago 4	1700 Walnut Street Philadelphia 3	96-A Huntington Avenue Boston 16



How to sell air conditioning to far more people!

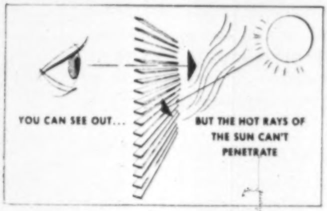


Just tie in with Kaiser Aluminum Shade Screening!

It's a simple device that's easily attached to any window: A *screen* that shades, cools, protects!

Kaiser Aluminum Shade Screening lowers temperatures of hottest rooms by reducing sun load passing through windows. Thus, to air condition a Shade Screened room takes far less refrigeration effort—can be done with smaller air conditioning units.

Result: You sell air conditioning to far more people. To people who ordinarily couldn't afford air conditioning. You multiply your list of prospects when you combine air conditioning with Kaiser Aluminum Shade Screening!



KEEPS OUT SUN!

Here's how Kaiser Aluminum Shade Screening works: Tiny louvers are set at an angle against the sun. They block the sun's hot rays—but not the view! Folks inside can see *out* through Shade Screening—neighbors can't see *in.*

Kaiser Aluminum Shade Screening does the work of Venetian blinds, plus awnings, plus insect screening . . . at one-tenth the cost of all three!

HERE'S HOW KAISER ALUMINUM SHADE SCREENING LOWERS TEMPERATURES

Typical Example of Heat Reduction with Kaiser Aluminum Shade Screening:

(for both residential and commercial applications)

Window exposure: West. Midsummer peak load (40° N. latitude) 3:00 p. m.

Sun load through 100 sq. ft. of unshaded windows	17,000 BTU per hour
Sun load through 100 sq. ft. of shade screening	1,700 BTU per hour

Heat load reduced by 15,300 BTU per hour —or 1.28 tons of refrigeration per 100 sq. ft. of glass

HIGH PROFITS!

Low-cost Kaiser Aluminum Shade Screening has the highest mark-up of any screening on the market! You'll be able to reap extra profits from this screening device . . . as well as the new profits from increased air conditioning sales.

Hurry—get set for the big sales season just around the corner! Fill in and mail the coupon below today for complete information.

Stores, homes, factories, offices . . . *all become prospects* for air conditioning sales when you sell them Kaiser Aluminum Shade Screening!

Kaiser Aluminum

SHADE SCREENING

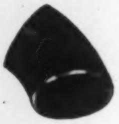
MAIL THIS COUPON NOW

KAISER ALUMINUM & CHEMICAL SALES, INC.
KAISER BUILDING, OAKLAND, CALIF.

Give me more information on how I can make *more* sales by combining air conditioning with Kaiser Aluminum Shade Screening! And please send me an AIA file and name of nearest manufacturer or jobber.

Name____________________
Address____________________
City__________ State__________

TO DO A BETTER PIPING JOB...



USE

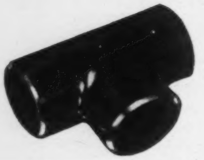
GLOBE

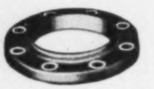
PRECISION PROCESS
SEAMLESS WELDING FITTINGS

Your preference for Globe Welding Fittings is supported by a source of supply with exceptional qualifications. Specialized metallurgical experience and facilities gained in years of steel tubing manufacture enable Globe to produce welding fittings by a precision process that yields a superior product.

Send for the Globe Welding Fittings Catalog No. 501.

GLOBE STEEL TUBES CO., Milwaukee 15, Wisconsin
Chicago — Cleveland — Detroit — New York — Philadelphia — St. Louis — Tulsa — Houston — Denver — San Francisco — Glendale, Calif.





SIZE RANGE OF GLOBE SEAMLESS WELDING FITTINGS

Description of Fitting	Standard Weight (Schedule 40)	Extra Strong (Schedule 80)	(Schedule 160)	Double Extra Strong
Elbows 45° Long Radius	½ in. to 24 in.	¾ in. to 24 in.	1 in. to 12 in.	1 in. to 8 in.
Elbows 90° Long Radius	½ in. to 24 in.	¾ in. to 24 in.	1 in. to 12 in.	1 in. to 8 in.
Elbows 90° Short Radius	1 in. to 24 in.	1½ in. to 24 in.	- - -	- - -
Returns 180° Long Radius	½ in. to 24 in.	1 in. to 24 in.	1 in. to 12 in.	3 in. to 8 in.
Returns 180° Short Radius	1 in. to 24 in.	1½ in. to 24 in.	- - -	- - -
Reducers (Concentric and Eccentric)	1 x ⅜ in. to 24 x 20 in.	1 x ⅜ in. to 24 x 20 in.	1 x ⅜ in. to 12 x 10 in.	1 x ⅜ in. to 12 x 10 in.
Tees Straight	¾ in. to 24 in.	¾ in. to 24 in.	1 in. to 12 in.	1 in. to 8 in.
Tees Reducing Outlet	¾ in. to 24 in.	¾ in. to 24 in.	1 in. to 12 in.	1 in. to 8 in.
Stub Ends Lap Joint	1 in. to 24 in.	1 in. to 24 in.	- - -	- - -
Caps	1 in. to 24 in.	1 in. to 24 in.	1 in. to 12 in.	1 in. to 8 in.

Flanges available 1 inch to 24 inches in all weights

Producers of Globe Seamless Stainless Steel Tubes —Gloweld Welded Stainless Steel Tubes—Carbon — Alloy — Seamless Steel Tubes — Globeiron Seamless High Purity Ingot Iron Tubes and Pipe.

...the Port Authority Bus Terminal

representing the most advanced architectural and engineering practices . . . . .

Grant Wilson
DUX-SULATION

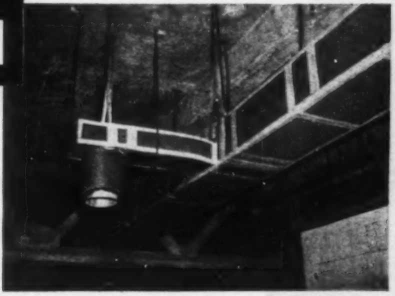
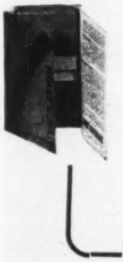


Photo of duct section in new terminal insulated with Grant Wilson Dux-Sulation.

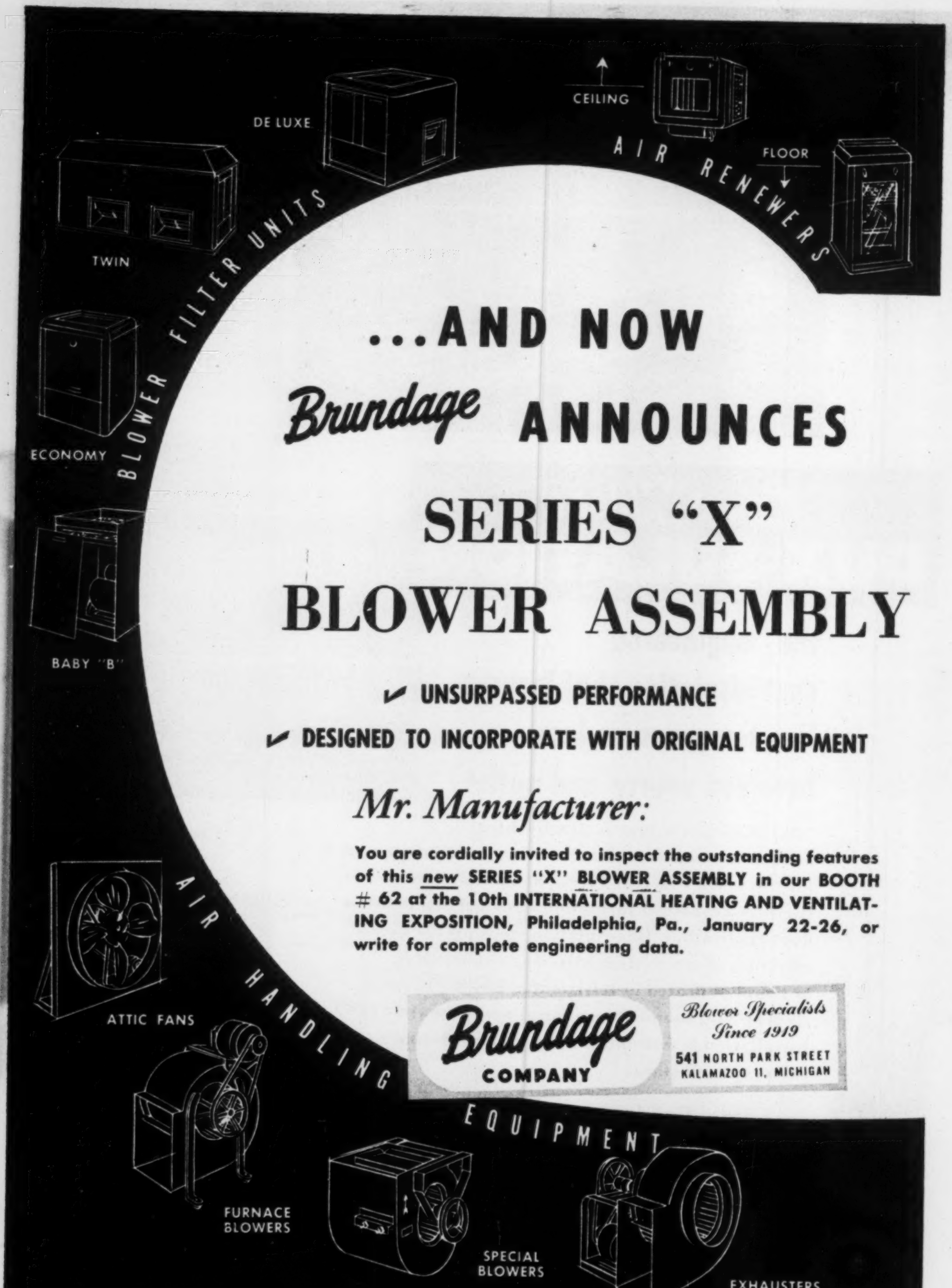
the "engineered" duct insulation that insures less temperature loss between source and outlet

***Dux-Sulation is just as practical for a small heating or air conditioning installation as it is for the world's largest Terminal shown above. A thermal/acoustical insulation designed expressly for duct application, Dux-Sulation steps up the overall efficiency of any system involving the transfer or travel of heated or refrigerated air. K Factor is .27 BTU and sound absorption is approximately 61%. Installation is fast and simple, and insulating values are constant.**



Inspect Dux-Sulation yourself. A handy sample kit and complete engineering data is yours for the asking. Write Grant Wilson, Inc. for Kit No. 531-8 to Board of Trade Bldg., Chicago 4, Ill.

Grant Wilson inc.
ASBESTOS and INSULATING MATERIALS


DE LUXE
CEILING
AIR RENEWERS
FLOOR
TWIN
BLOWER FILTER UNITS
ECONOMY
BABY "B"
AIR HANDLING EQUIPMENT
ATTIC FANS
FURNACE BLOWERS
SPECIAL BLOWERS
EXHAUSTERS

...AND NOW

Brundage ANNOUNCES

SERIES "X" BLOWER ASSEMBLY

- ✓ UNSURPASSED PERFORMANCE
- ✓ DESIGNED TO INCORPORATE WITH ORIGINAL EQUIPMENT

Mr. Manufacturer:

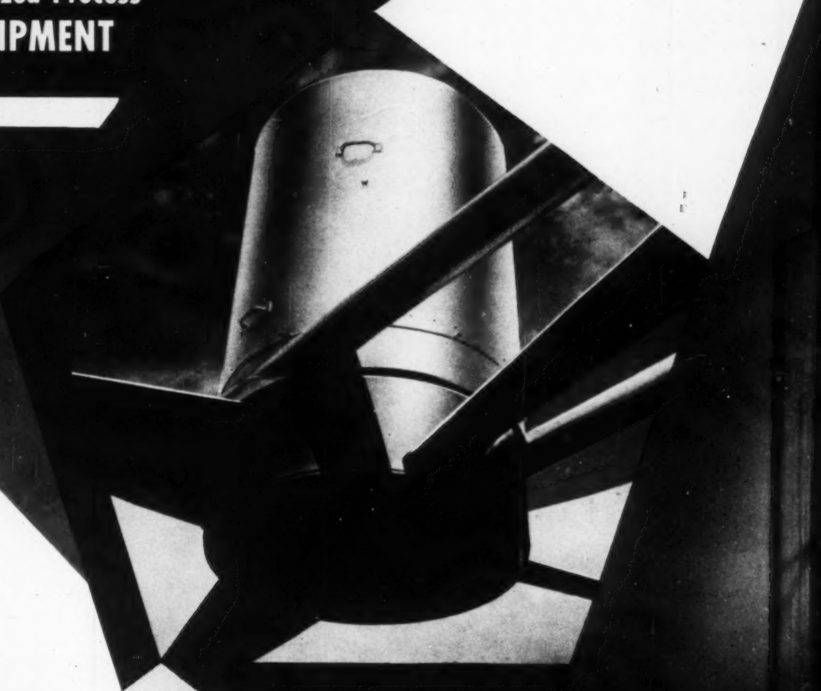
You are cordially invited to inspect the outstanding features of this *new* SERIES "X" BLOWER ASSEMBLY in our BOOTH # 62 at the 10th INTERNATIONAL HEATING AND VENTILATING EXPOSITION, Philadelphia, Pa., January 22-26, or write for complete engineering data.

Brundage
COMPANY

Blower Specialists
Since 1919

541 NORTH PARK STREET
KALAMAZOO 11, MICHIGAN

Producers
of
QUALITY
Specialized Process
EQUIPMENT



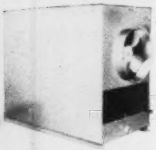
Producers
of
QUAL
Specialized
EQUIPM

EQUIPMENT DIVISION

J.F. Pritchard & Co.

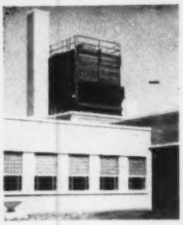
Watch for
Pritchard's
NEW
COTOPACK*
Quality Packaged Cooling Tower
Announcement Coming Soon

Pritchard Series "P" Tower



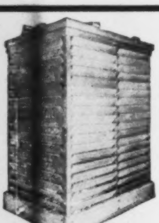
Provides low-cost, indoor or outdoor water cooling service of relatively small capacities (6 to 20 tons). Also suited for jacket water, air compressor and many other services. Highest quality materials, including California Redwood decking. Shipped "knocked down" or shop assembled. Easily installed. Available in painted steel, stainless steel or aluminum.

Write for Bulletin No. 5.6.082



Pritchard Series "Q" Tower

Especially adapted to air conditioning, refrigeration and industrial heat loads and suitable for roof or ground level installations. These vertical counterflow towers are manufactured of highest quality materials and present a neat, lasting appearance. Sizes range from 100 to 1500 tons capacity.



Pritchard Series "SRF" Towers

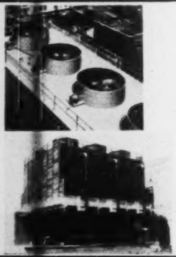
Constructed of Redwood with steel pipe distribution system. Suited to air conditioning installations requiring 3 to 24 tons capacity. Materials prefabricated before shipment. Bolts, nuts, washers, and nails furnished. Instructions included for quick field assembly. Efficient, low-cost operation. Series "SRE" Towers available for specific heavy duty industrial application.

Write for Bulletin No. 5.9.081.

Pritchard Series "G" Tower

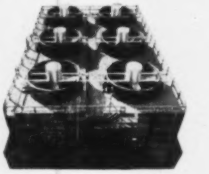
Designed for medium capacity industrial application from 20 to 100 tons capacity. Air enters tower from any direction, assuring uniform air distribution for maximum cooling effect. Prefabricated for fast, easy field assembly. Available in Redwood or steel construction. Series "H" (Horizontal air flow) towers also available for special installations.

Write for Bulletin No. 5.4.080.



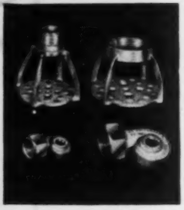
Pritchard Series "N" Towers

The Series "N" induced draft tower is for larger industrial air conditioning or refrigeration applications. Maximum cooling efficiency is delivered through the use of true counterflow mixing of air and water. Available in either Redwood or steel construction.



Pritchard Sealdflow* Fan Drive

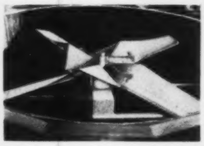
No hot, corrosive, saturated vapors from cooling tower interiors can contact the fully encased mechanism of this patented unitized fan drive assembly. The motor and gears are mounted directly on the fanshaft over the fan and are enclosed in one compact unit. (See illustration on preceding page.) Self-ventilated by fresh air drawn in from outside the fan stack, SEALDFLOW* is only gear-motor fan drive for large cooling tower fans that is completely integrated for utmost efficiency.



Pritchard COTOSPRAY* Nozzles and Sprinkler Heads

Pritchard COTOSPRAY nozzles and sprinkler heads are manufactured of highest grade bronze casting, accurately calibrated for efficient operation. Available in a wide range of sizes for any cooling tower application.

Pritchard POWairSAVER* Fans



Developed especially for cooling tower duty, POWairSAVER* fans provide reliable, efficient operation. High aerodynamic efficiency saves horsepower. Available in diameters of 5' through 20' in increments of 12 inches. May be placed vertically or horizontally. Blades have adjustable pitch.

Write for Bulletin No. 4.3.080A.

*Registered Trade Name.

All types of Pritchard Redwood Cooling Towers are also available in Pritchard's FIRETITE* construction, at a slight additional cost.

EQUIPMENT DIVISION
J.F. Pritchard & Co.
DEPT. 119 — 908 GRAND AVE., KANSAS CITY 6, MISSOURI

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PLAN *with* BALDOR

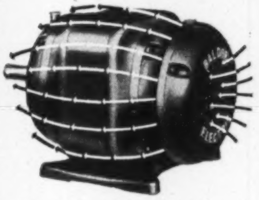
Your Engineering Staff PLUS Baldor Motor Specialists make a good strong team.

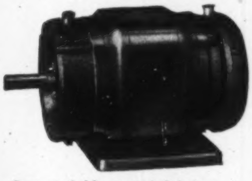
In planning new products and redesigning equipment, let the helpful cooperation of the Baldor Engineering Staff serve as a supplementary section of your own Engineering and Production Departments.

In our quarter-century of diversified motor-applications experience, we have probably solved — for other manufacturers — the very problems that now confront you on your drawing boards.

PLAN WITH BALDOR — the Better Motor for a Better Product.

BALDOR ELECTRIC COMPANY, 4353 Duncan Ave., ST. LOUIS 10, MO.
District Offices in Principal Cities

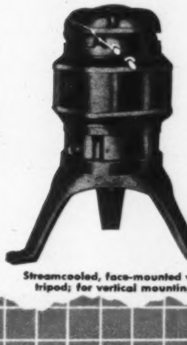

Streamcooled, polyphase, 1 to 20 h.p. (arrows indicate forced air cooling over entire exterior of motor frame).

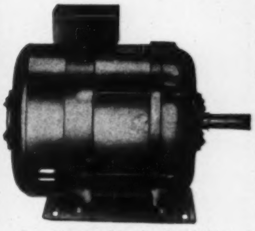

Streamcooled face mounted; 1 phase, 3 phase and direct current.

Baldor builds a complete line of bench and pedestal type Grinders, 6" to 12" wheels, ¼ to 3 h.p., including a special Carbide Tool Grinder.

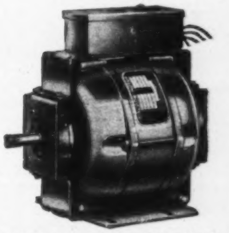
Streamcooled, single phase, ¾ to 7½ h.p.

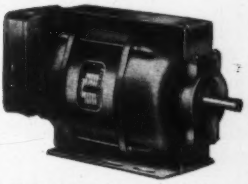
Streamcooled, direct current, 1 to 5 h.p.


Streamcooled, face-mounted with tripod; for vertical mounting.


Open, drip-proof construction; 1/6 to 1/3 h.p., 1 phase, 3 phase and direct current.

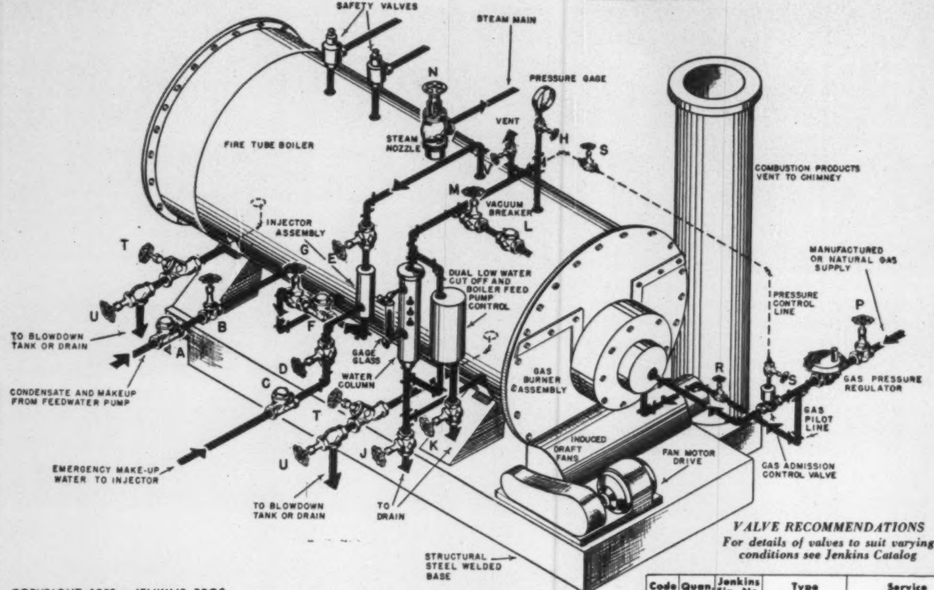
Streamcooled, round frame, 1/3 to ¾ h.p., 1 phase, 3 phase and direct current.


Resilient-mounted, open, drip-proof, for belt drive; 1/10 to ¾ h.p., single phase.


Resilient-mounted fan motor 1/30 to ½ h.p., 1 phase; ⅛ to ½ h.p., 3 phase.

Baldor
BETTER MOTORS
FOR MORE THAN A QUARTER OF A CENTURY

JENKINS PRACTICAL PIPING LAYOUTS 52


SAFETY VALVES
STEAM MAIN
N
PRESSURE GAGE
VENT
H
S
STEAM NOZZLE
FIRE TUBE BOILER
V
M
VACUUM BREAKER
L
COMBUSTION PRODUCTS VENT TO CHIMNEY
INJECTOR ASSEMBLY
T
G
E
DUAL LOW WATER CUT OFF AND BOILER FEED PUMP CONTROL
MANUFACTURED OR NATURAL GAS SUPPLY
PRESSURE CONTROL LINE
P
U
B
F
TO BLOWDOWN TANK OR DRAIN
A
GAGE GLASS
D
WATER COLUMN
GAS BURNER ASSEMBLY
R
S
GAS PRESSURE REGULATOR
C
CONDENSATE AND MAKEUP FROM FEEDWATER PUMP
T
GAS PILOT LINE
INDUCED DRAFT FANS
FAN MOTOR DRIVE
U
J
K
EMERGENCY MAKE-UP WATER TO INJECTOR
GAS ADMISSION CONTROL VALVE
TO BLOWDOWN TANK OR DRAIN
TO DRAIN
STRUCTURAL STEEL WELDED BASE

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VALVE RECOMMENDATIONS
For details of valves to suit varying conditions see Jenkins Catalog

Code	Quan.	Jenkins Fig. No.	Type	Service
A	1	762	Br. Swing Check	Prevent Back flow to Boiler Feed Pump
B	1	49	Br. Gate	Feedwater Shutoff
C	1	762	Br. Swing Check	Prevent Back flow to Emergency Make-up
D	1	950	Br. Globe	Emergency Make-up Manual Control
E	1	956	Br. Globe	Control Steam Flow to Injector
F	1	762	Br. Swing Check	Injector Mixture to Boiler
G	1	950	Br. Globe	Emergency Make-up Admission to Boiler
H	1	741-G	Br. Needle	Pressure Gage Control
J	1	956	Br. Globe	Water Column Blowdown
K	1	956	Br. Globe	Blowdown Control
L	1	756	Br. Lift Check	Vacuum Breaker Air Admission
M	1	950	Br. Globe	Vacuum Breaker Shutoff
N	1	925	I.B.B.M. Angle	Steam Nozzle discharge
N	1	293	I.B.B.M. Angle S & C	Where 2 or more boilers feed one system
P	1	370	Br. Gate	Gas Shutoff
R	1	741-G	Br. Needle	Gas Pilot Shutoff
S	2	741-G	Br. Needle	Pressure Control Line Shutoff
T	2	124	Br. Blowoff	Blowdown assembly
T	2	297	I.B.B.M. Blowoff	Blowdown assembly
U	2	952	Br. Angle	Blowdown assembly
U	2	615	I.B.B.M. Angle	Blowdown assembly
V	1	741-G	Br. Needle	Boiler Vent Valve

How to plan PACKAGE BOILER CONNECTIONS

Package Boiler Units for power generation, heating and industrial process work, are in increasing demand. Usual requirements vary from 20 to 500 boiler horsepower and for pressures up to 900 p.s.i. Shown here is a gas fired, 100 p.s.i., fire tube type, with all piping connections conforming to A.S.M.E. Boiler Code.

Two means of boiler feed are provided, the normal feed from condensate return and the emergency feed by means of a manually operated steam injector. A dual low water cut-off and boiler feed control is provided with float and electrode type cut-offs and boiler feed control for maintaining constant water level incorporated in a single unit.

The failure of feedwater from the normal source would cause this dial unit to cut off the fuel supply and sound an audible alarm. If boiler operation is required immediately, cold water make up can be introduced through the manually operated steam injector.

Consultation with accredited piping engineers and contractors is recommended when planning major piping installations.

A CHOICE OF OVER 500 VALVES

To save time, to simplify planning, to get all the advantages of Jenkins specialized valve engineering experience, select all the valves you need from Jenkins Catalog. *It's your best assurance of lowest cost in the long run.*

Jenkins Bros., 100 Park Ave., New York 17; Jenkins Bros. Ltd., Montreal.

Jenkins Bros., 100 Park Ave., New York 17

Reserve copy of new book of piping layouts — Nos. 26 to 50 — now in preparation.

Name ....

Company ....

Address ....

....

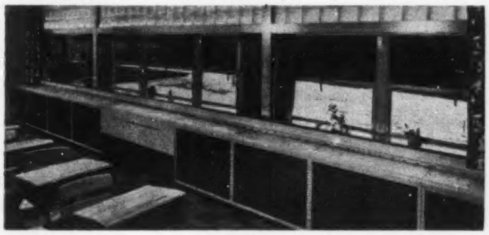
JENKINS
LOOK FOR THE DIAMOND MARK
VALVES
SINCE 1864
TRADE JENKINS MARK

Jenkins Bros

EQUIPMENT DEVELOPMENTS...

Schoolroom Ventilation Unit

HPAC 1—"Draft Stop" ventilation is a new development in schoolroom heating and ventilating designed to intercept the chilling down drafts encouraged by the large window areas of today's modern classrooms. The system has been developed by Herman Nelson, Div., American Air Filter Co., Inc., Moline, Ill.

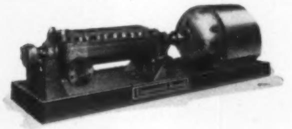


The unit ventilator incorporates a long slot placed at the base of the windows to catch the down drafts. This cold air is circulated through the unit for heating before being discharged into the room, or it may be expelled from the room.

The system is said to retain all of the comfort advantages of traditional unit ventilator systems. Automatic controls determine the amount of outside air taken into the room and how much room air is circulated. A further advantage, says the company, is its positive action of pulling warm air from the inside walls toward the window walls.

Multi-Stage Centrifugal Pumps

HPAC 2—Ingersoll-Rand Co., 11 Broadway, New York 4, is offering a line of completely new multi-stage centrifugal pumps for high pressure applications (up to 1200 psi). Known as the class HMTA, these units are built in 3-, 4-, 5-, and 6 in. sizes with from 3 to 9 stages. Capacities range up to 1600 gpm.



The pumps are said to be exceptionally efficient, easy to maintain, and dependable. Applications include boiler feed, pipe line, and refinery pumping as well as other general high pressure industrial services. Features of the new design are its cylindrical bore, horizontally split casing and compact, unit-type rotor assembly.

Convertible Recorder

HPAC 3—A new 6 in. chart recorder of Gotham Instruments, Div. of American Machine & Metals, Inc., 149 Wooster St., New York 12, is recommended for recording temperatures and pressures under a variety of changing conditions.

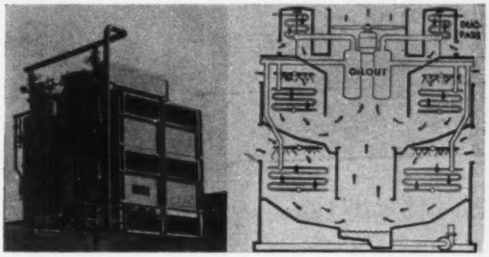
Temperature and pressure systems of this recorder are interchangeable so that at any time the instrument may be converted from a temperature to a pressure recorder or vice versa, or changed in range of temperatures or pressures recorded. Temperature ranges are from –40 to 1000 F and pressure ranges are from 0 to 5000 psi.

The instrument bulb is filled with mercury, gas or vapor depending upon its use and the size of the bulb depends upon the filling and the length of tubing actuated.

Refrigerant Condenser

HPAC 4—The new 300 ton "Aeropass" condenser of Niagara Blower Co., 405 Lexington Ave., New York City, is similar to smaller units of the company, making use of the "Duo-Pass" precooling coil and "Oilout" oil separator.

As shown on the accompanying diagram, the refrigerant gas first passes through the precooling coils which are located on top of the structure. These coils remove the superheat, reduce the gas temperature close to its condensing point, and condense entrained oil vapors which are removed from the system by the separator drums. The gas then passes to the condensing coils where it is condensed by the effect of evaporation of a strong water spray. Since



FOR YOUR CONVENIENCE [1-51]

Heating, Piping & Air Conditioning
6 N. Michigan Ave., Chicago 2, Ill.

Please ask the manufacturers to send me more information about the equipment mentioned under the following reference numbers in Equipment Developments and Recent Trade Literature

(Circle each HPAC number in which you are interested)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	
101	102	103	104	105	106	107	108	109	110
	112		114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134						

Name .... Title ....
Company ....
Address ....
City .... Zone ...... State ....

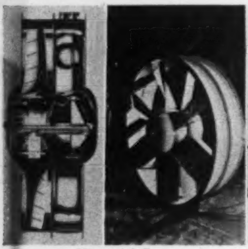
the superheat has been previously removed there is no tendency, says the company, for salts to precipitate and clog the condenser coil banks.

Air is drawn through the condenser by a propeller fan and the spray water falls to a tank at the base from which it is recirculated by a pump.

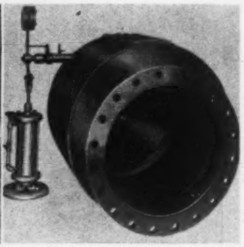
Axial Flow Ventilating Fan

HPAC 5—The Series 16 vaneaxial ventilating fans of Moore Co., 800 S. Missouri, Marceline, Mo., are available in diameters from 3 ft to 5 ft with capacities from 11,000 to 30,000 cfm.

Units are of the direct drive type and are recommended for use against moderate static pressures. The motor is completely enclosed within the hub and housing, and permanently sealed lubricated ball bearings are used. The manufacturer recommends these fans particularly for handling lint or dust laden air. Since no outside air is circulated through the motor enclosure, all cooling is accomplished by heat transfer through the metal of the hub and housing.



Vaneaxial Fan



Check Valve

Disc Type Check Valve

HPAC 6—Norwalk Valve Co., 33 Railroad Ave., South Norwalk, Conn., is offering a line of fabricated reverse flow steel check valves for virtually all types of pressures and applications. The company's disc type check valve is used to control reverse flow of gas or air.

At the recent exposition of the Gas Appliance Manufacturers Association, the company exhibited large check valves with hydraulic type dashpots. This is a new development which is said to solve the problems of fluttering (caused by high velocity) and slamming of the disc (caused by an abrupt reversal of the flow).

The disc type check valves are made in sizes from ½ in. up to and including 42 in.

Fuel Oil Tank Gage

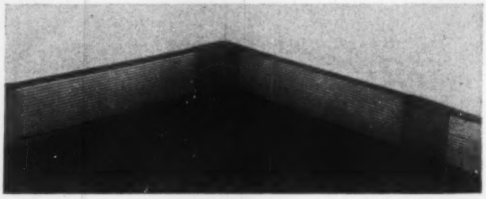
HPAC 7—The new four-way reading fuel oil tank gage (model C-100) of Mel Gauge Co., East Haven, Conn., has raised figures which the company states will not wear off and can be read from a distance, either from the front or the rear of the oil tank. Readings are in both fractions and in gallons.

The device can be installed with or without oil in the tank and is guaranteed by the manufacturer to be leakproof. The float is of all-metal construction and all parts are said to be rustproof. The gage is available for tank depths 22 in. to 24 in., 26 in. to 27 in., 42 in. to 44 in., and for special sizes.

Electrically Heated Glass Baseboard Panels

HPAC 8—The newly developed "Electriglas" radiant heat baseboard panels will be exhibited for the first time this month at the International Heating & Ventilating Exposition. The manufacturer is Appleman Glass Works, Bergenfield, N. J.

The baseboard unit consists of a glass panel encased in a steel frame. Designed to take the place of the ordinary baseboard, it is usually surface mounted in old construction and recess mounted in new construction. The panel is said to contain a chemical element which is literally fused into the back surface of the glass. According to the manufacturer, the surface temperature of the glass reaches approximately 240 F, and the tempered glass is virtually unbreakable. Units are fully automatic in operation and are used with a separate low voltage thermostat and relay. The heating element in each panel is guaranteed for five years by the company.

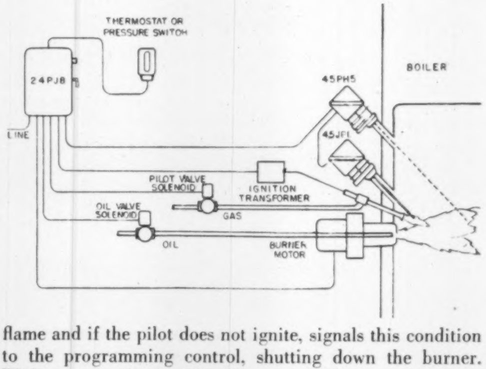


Designed for maximum flexibility with a minimum number of component parts, these baseboard panels are available in two sizes — the 300 watt unit is 42 in. long, and the 200 watt unit is 30 in. long. Both types are 6½ in. high and 1¼ in. deep. The system is assembled by butting the sections end to end and holding them together by ½ in. conduit nipples, lock nuts, and bushings. The nipples act as openings for passage of the jumper wires which connect the individual panels in parallel.

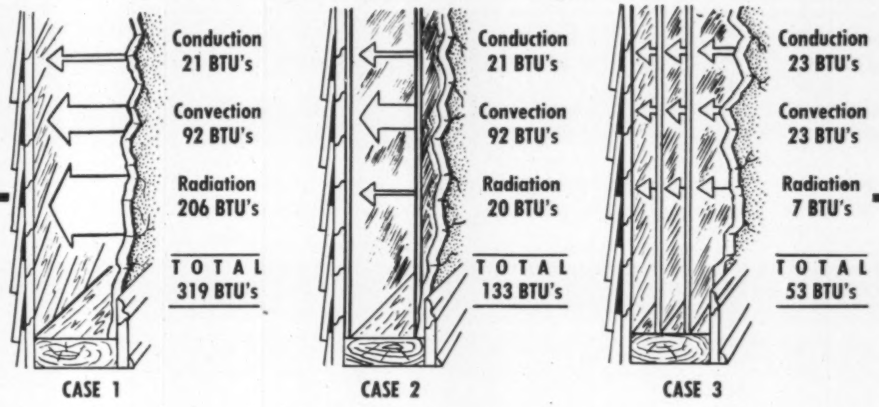
Safeguard for Gas-Oil Burners

HPAC 9—Combustion Control Corp., 77 Broadway, Cambridge 42, Mass., is offering a system for supervising both the pilot gas flame and the main flame on industrial gas-oil burner installations.

The system consists of electronic flame rod type 45JP1, photoelectric scanner type 45PH5, and programming control type 24PJ8. The flame rod "feels" the gas pilot flame and if the pilot does not ignite, signals this condition to the programming control, shutting down the burner. With proper pilot ignition the main fuel valve opens. Its



In an uninsulated wall space, 65% to 80% of all heat flow is by RADIATION



CASE 1

An uninsulated wall space. The surfaces of ordinary building materials, including ordinary insulations, have a Radiation or emissivity rate of more than 90%, a heat ray absorption rate of over 90%. Air has slight density, so Conduction is slight, 21 BTU's. There is nothing to block convection, 92 BTU's. *Note:* 206 BTU's out of total 319 BTU's going through this wall space was Radiation.

CASE 2

The same wall space except that inner surfaces were lined with sheets of metal of 15% emissivity and absorption. Note drastic drop in heat flow by radiation, from 206 BTU's to 20 BTU's. Conduction and Convection stay the same. Original total of 319 BTU's dropped to 133 BTU's.

CASE 3

Two sheets of 15% emissive metal divide the wall space into 3 reflective compartments. Heat loss by Radiation dropped to 7 BTU's against original 206 BTU's. The 2 sheets blocked Convection so that its flow fell from 92 BTU's to 23 BTU's. Conduction rose only 2 BTU's; from 21 to 23 BTU's. The total flow in BTU's dropped 85% from the original 319, to 53 BTU's.

The aluminum used in multiple sheet accordion insulation has emissivity and absorption rates of only 3%, or 5 times better than the 15% cited. Type 4 Infra, a commercial form of multiple aluminum, has 3 blocks to Convection heat flow, and Type 6 Infra has 5 blocks, against only 2 cited in Case 3.

NOTE: Figures based on booklet, "Insulating Effect of Successive Air Spaces Bounded by Bright Metallic Surfaces," published by the American Society of Heating & Ventilating Engineers. Free copy will be sent by Infra; just use coupon.

THERMAL FACTORS, TYPE 6 INFRA

Down-Heat C.044, R22.72 equals 7½" DRY Rockwool
Up-Heat C.080, R12.50 equals 4" DRY Rockwool
Wall-Heat C.073, R13.69 equals 4½" DRY Rockwool
VAPOR PERMEABILITY equals ZERO

INFRA INSULATION, INC.
10 Murray Street New York, N. Y.
Telephone: COrtlandt 7-3833

INFRA INSULATION, INC.
10 Murray Street, New York, N. Y. Dept. H-1

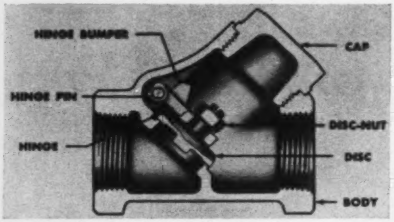
Please send free booklet: "Insulating Effect of Successive Air Spaces Bounded by Bright Metallic Surfaces."

Name____________________
Firm____________________
Address____________________

☐ Send Prices of Infra Insulations ☐ Send Sample flame is then monitored by the scanner when oil is used or by the flame rod when gas is the main fuel. The programming control is designed to provide accurate setting of both fuel valve delay and post ignition periods. Timing is accomplished through a synchronous motor.

Regrinding Swing Check Valves

HPAC 10—A new line of Y pattern brass swing check valves is offered by Crane Co., 836 S. Michigan Ave., Chicago 5. Of the regrinding type, they are in the 200 and 300 lb pressure classes. Screwed end patterns are available in sizes 1/4 to 3 in.; flanged end patterns in sizes 1 to 3 in.



A large cap opening on the same centerline as the seat opening permits access for regrinding or replacement of parts. Easy contours in the Y pattern body are said to offer minimum resistance to flow and valves can be used on lines where flow is horizontal or upward.

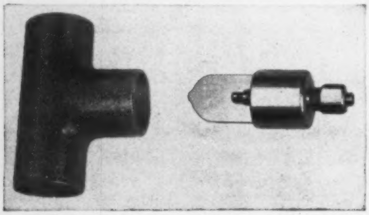
Hot Water Convertors

HPAC 11—Doyle & Roth Mfg. Co., Foot of 23rd St., Brooklyn 32, N. Y., has developed a new line of hot water convertors designed to supply hot water to radiant heating panels or hot water systems. The water for heating flows through the tubes with steam in the shell. Either live or exhaust steam may be used.

Units are especially recommended for use in hotels, schools, public buildings, industrial plants, housing developments, etc.

Balancing Adapter for Hot Water Heating

HPAC 12—The new balancing adapter of Maid-O'-Mist, Inc., 3217 N. Pulaski Rd., Chicago 41, has been designed for use with forced hot water heating systems in connection with balancing the water flow through radiators, convectors, baseboard panels, radiant coils, return mains, and branches.



The unit is sweated into any standard copper or bronze tee of the same pipe size and may be inserted in the side outlet of the tee (making a straightway balancing valve) or inserted in the direction of flow (making an angle balancing valve). Separate balancing cocks are not needed as the new unit makes a balancing valve of any tee.

Manufactured of nonferrous metals, the device is packaged in 3/8, 1/2, 3/4 and 1 in. nominal pipe sizes.

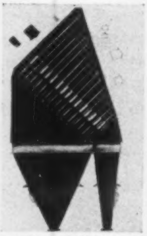
Tubular Dust Collector

HPAC 13—A tubular dust collector designed to permit the refiring into boiler furnaces of high carbon particles without causing recirculating of all of the fly ash through the boiler, dust collector and induced draft fan, has been developed by Prat-Daniel Corp.

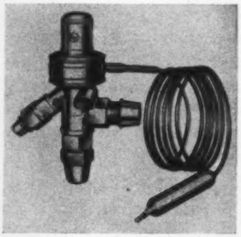
Separation of high carbon particles from the fly ash of low carbon content is accomplished within a single unit and with one pass of the gases. Two hoppers are provided; the larger particles, suitable for refiring are decanted into one system for re-use; the low carbon particles are deposited in a separate system for disposal.

This method, known as "P-D Decantation", does not increase the normal resistance through the dust collector unit, says the company.

Additional information may be obtained from Thermix Corp., Greenwich, Conn., sales and project engineers for the manufacturer.



Dust Collector



Thermostatic Expansion Valve

Thermostatic Expansion Valve

HPAC 14—A new thermostatic expansion valve is available from A-P Controls Corp. (formerly Automatic Products Co.), 2450 N. 32 nd St., Milwaukee 45.

This model 209 valve has an adjustable pressure limit setting, with an adjustment range of from 0 to 55 psi, which adapts it for use on any application where overload protection is desired. Also featured is a new superheat adjustment designed to cover the entire normal operating range. Both adjustment devices are covered by moisture-tight and tamperproof caps.

An important advantage is said to be the use of a liquid charge which permits the valve to be used in any ambient temperature and in any position for low temperature, commercial, or air conditioning applications.

Blow Torch

HPAC 15—Otto Bernz Co., Inc., Rochester, N. Y., is offering a redesigned aluminum-tank blow torch weighing only slightly more than 2 lb. It is recommended for general maintenance and repair work.

The filling operation requires no special tools and a lock on the stuffing box nut is said to prevent "backing out" of the valve on the burner. The aluminum tank is welded and guaranteed leakproof.

Controlled Ventilation

Certified Ratings
PFMA

The DeBothezat POWER-FLOW Roof Ventilator is a motor-driven fan in a weatherproof housing, for use with or without duct systems. POWER-FLOW Roof Ventilators can be used either for air exhaust or intake.

LOW, STREAMLINED DESIGN

POWER-FLOW'S modern appearance blends well with modern architectural designs. Available with fan wheels 12" through 48" in diameter, delivering up to 40,900 CFM.

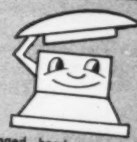
NEW

12" POWER-FLOW VENTILATOR

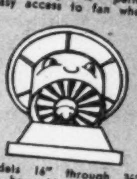
For exhaust applications in toilets, filling stations and locker rooms. 975 CFM capacity at free delivery. Head and screen readily removable. 2-speed operation, if required.

SEND FOR FREE CATALOG! 16 pages of illustrations, dimensions and specifications on POWER-FLOW Roof Ventilators. Write Dept. H151.

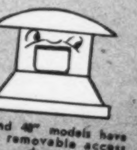
LIGHT-PROOF AT NIGHT to comply with possible BLACKOUT regulations



Hinged head on models 16" through 48" permits easy access to fan wheel.



Models 16" through 36" also have hinged housing for access to motor.



42" and 48" models have easily removable access door.

Power-Flow

ROOF VENTILATORS

Built by

DE BOTHEZAT FANS DIVISION

AMERICAN MACHINE AND METALS, INC.

East Moline, Illinois

VISIT OUR EXHIBIT AT INTERNATIONAL VENTILATING EXPOSITION • BOOTH 440 •

Where Water Is the Problem . . .

CHOOSE GOVERNAIR

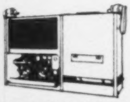
EVAPORATIVE CONDENSERS

If you think a camel goes a long way on a little water . . . then you should see this Governair Evaporative Condenser operate! Save up to 95% of water normally used by water-wasting type condensers! Eliminate waste-water disposal problems and pumping costs, too. Engineered to give maximum efficiency and performance at a minimum cost.

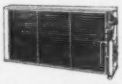
Choose a Governair Evaporative Condenser, and *forget* those water problems!

Governair Evaporative Condensers are also furnished as an integral part of universally acclaimed Governair Packaged Air Conditioners.

AIR CONDITIONER



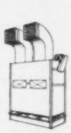
COMPLETELY PACKAGED AIR CONDITIONER



BLAST COILS FOR HEATING & COOLING

ORIGINATORS OF COMPLETELY PACKAGED AIR CONDITIONERS

GOVERNAIR



UNIT COOLER

GOVERNAIR CORPORATION • 513 N. BLACKWELDER • OKLAHOMA CITY, OKLA.

Safety Relief Valve

HPAC 16—The new series 3345-33150 large capacity safety relief valve is available from McDonnell & Miller, Inc., Chicago 18, Ill., and is recommended for water heaters and tanks and for heating systems operating at higher pressures.

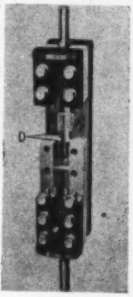
Designed to prevent excess pressure in a hot water system, the valve is rated in Btu capacity — its capacity to dissipate heat. With this rating, says the company, it is possible to select a valve which will open at the desired pressure and which has a capacity equal to the heat output of the firing device.

At normal temperature, water is relieved at a low rate, but when the temperature rises into the emergency zone, the increased velocity acts on the "Hydralift" ring, snapping the valve wide open. The valve needle is of hardened and ground stainless steel. The seat is also of stainless and all working parts are corrosion resistant. The testing lever works independently of automatic action.

Opening pressures are 45, 70, 100, or 150 psi.

High Pressure Water Level Gages

HPAC 17—The high pressure, flat glass, water level gages of Yarnall-Waring Co., Mermaid Lane, Philadelphia 18, are now fitted with special nonstick gaskets.



The gaskets are coated with a special compound used to prevent adhering to the gage metal surfaces under high temperature and high pressure service. This "Frelon" gasket is the molded pressure-sealed gasket located in the grooves of the gage insert body and indicated as D in the illustration. The compound is also used to coat asbestos cushion gaskets used between cover plates and outer surfaces of the front and rear flat glasses.

Electric Submersible Pumps

HPAC 18—Sumo Pumps, Inc., 1 Atlantic St., Stanford, Conn., is offering a line of electric submersible pumps in sizes from 0.7 to 60 hp with capacities from 5 to 1250 gpm.

The pump and motor are assembled as a unit and are designed to operate in the well completely submerged in water. Installation is effected by lowering the pump on its riser pipe to the proper depth and connecting a submarine power cable to a convenient source of electric power supply. The multistage centrifugal pump is of bronze and stainless steel construction. The motor, which is especially built for under water operation, is of the dry stator type with the rotor running in and cooled by water.

Boiler Water Treatment

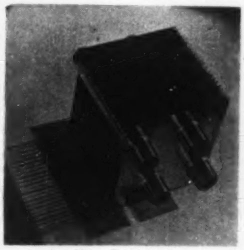
HPAC 19—The new boiler water treatment offered by Warren Refining & Chemical Co., 750 Prospect Ave., Cleveland 15, is a coagulant said to combine the advantages of chemical and colloidal compounds.

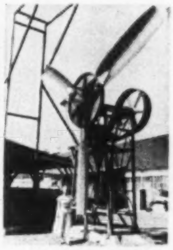
Designated as "Luminite", it is recommended for the removal and prevention of scale formation and for the elimination of pitting, rust, corrosion, foaming and priming in steam boilers. The material is custom-made in that it is formulated to the customers' specifications, after an inspection and survey of operating conditions.

Heat Exchanger

HPAC 20—An improved heat exchange unit, which requires no welding or soldering in the assembly, has been developed by Carpenter Steel Co., Union, N. J.

In making the exchanger, stainless steel tubing, ⅝ in. in diameter and 0.049 in. thick, is mechanically bonded to flat plate-type fins of stainless steel. The fins are stamped and belled to form a bonding collar at each opening. A tool steel bullet, propelled by compressed gas, is forced through the tube expanding it uniformly against the collars of the fins.


Heat Exchanger


Cooling Tower Fan

Cooling Tower Fan

HPAC 21—Designed for large volume air movement, a new 22 ft fan recently developed by Hartzell Propeller Fan Co., Piqua, Ohio, delivers 1,250,000 cfm at 180 hp.

Designed for cooling tower use in the air conditioning and oil refining industries, the company's cooling tower fans range in diameter from 3 to 22 ft. All have adjustable pitch propellers and are made of the company's "Hartzite" plastic which is designed to absorb vibration and to withstand cracks and cuts such as those caused by falling objects. In addition, the material is said to have no fatigue limit and to withstand the action of salt water, mild acids and alkalies unusually well.

Pocket Thermometer

HPAC 22—Tagliabue Instruments Div., Weston Electric Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J., has introduced the "Thermicator", a pocket type thermometer designed for use either as an armored or as a plain thermometer for temperatures between −30 F and 120 F.

It consists of an etched-stem glass thermometer and a light weight, noncorroding protective case. Said to be slimmer than most fountain pens, it is held in a coat, shirt or vest pocket by an adjustable clip. The metal case is open at both ends. The thermometer can be suspended from a cord through its eye and immersed in a fluid or medium. Relatively large apertures in the case are designed to assure circulation of most light liquids or vapors around the bulb. For general temperature testing where it is not exposed to the danger of breakage, the instrument may be removed from the case.

HOW TO SAVE UP TO
$5,000
ON AIR CONDITIONING
GOVERNAIR
COMPLETELY PACKAGED
AIR CONDITIONER
PAT. NO. 2,297,928

Save water! Save space! Save installation time and money! Save operating costs! Yes, install Governair and *save from $50 to $200 for each ton* of the completely packaged Governair unit designed to fit your needs!

Experience proves Governair can save you up to $5,000 on a 50-ton Governair unit that gives greater dependability and more "engineered efficiency" than ever before!

If you want the best — if you want the most economical and reliable air-conditioning unit on the market . . . CHOOSE GOVERNAIR and SAVE!

AIR CONDITIONERS
EVAPORATIVE CONDENSERS
BLAST COILS FOR HEATING & COOLING
ORIGINATORS OF COMPLETELY PACKAGED AIR CONDITIONERS
GOVERNAIR
UNIT COOLERS

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at —

B.A.C.

Booth 621

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•

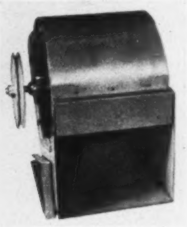
— *Specializing in Water-Saving Devices Since 1935* —

Compressed Air Separators

HPAC 23—A new separator for cleaning of compressed air by means of centrifugal force is offered by Swartwout Co., 18511 Euclid Ave., Cleveland 12. Known as the "Airfuge," it is available in seven inlet and outlet tapping sizes, from ½ in. to 2½ in.

According to the manufacturer, the separator removes 99 percent or more of all impurities from compressed air without pressure drop. Moisture, oil, scale and other solids in the air are whirled outward to the walls of the unit where they drain down to the trap section. A float-operated trap is used to automatically release accumulated liquids as they rise to a level above that necessary to effect a seal.

Air Separator



Blower Assembly

Small Blower Assembly

HPAC 24—The construction of the new No. 139 small blower assembly, manufactured by Viking Air Conditioning Corp., 5600 Walworth Ave., Cleveland, is said to make it particularly suitable for installation in furnaces or air conditioners where width space is limited or where relatively high air pressure and low air volume are desired.

The blower wheel has the same wheel diameter (13 in.) as the No. 1312 and produces the same air pressure. However, the No. 139 is 3 in. narrower in width. It is available in a variety of arrangements.

Temperature Regulator

HPAC 25—The "Stacon" self operated, hermetically sealed temperature regulator is once again on the market and is available from Farris Stacon Corp., 563 Commercial Ave., Palisades Park, N. J.

Operation is based on a vapor flash principle. As liquid in the control bulb expands with an increase in ambient temperature, it is forced into a steam jacketed bellows and immediately flashes to vapor. The pressure extends the bellows and moves an attached disc toward the valve seat, thus throttling the valve. As the control bulb cools, the power bellows vapor is forced back into the capillary where it condenses. The resulting pressure reduction contracts the bellows and lifts the valve off its seat. To prevent variations in heating steam temperature from activating the power bellows, a balance bellows is provided immediately beneath which acts in the opposite direction under the same steam temperature and nullifies the force—resulting in no net movement of the disc. According to the company, excessive steam temperature cannot cause rupture of the control fluid system because of the condensing characteristics of the capillary where it enters the power bellows.

Steam Generator

HPAC 26—Cyclotherm Corp., Oswego, N. Y., is offering a new addition to its line of automatic package type steam generators. It may be fired either with light oil, heavy oil, gas, or combination gas and oil. It is available for pressures from 15 to 200 psi and is fully equipped with an integral burner, fully automatic safety and operating controls, steam trim, valves and other equipment.

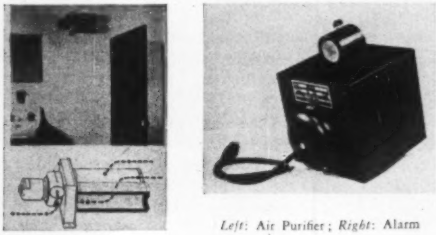
The boiler surface is insulated with fiber glass over which is fitted a metal jacket. Units are ready to operate upon arrival, the only connections required being water, steam, fuel and electricity.

Lavatory Air Purifier

HPAC 27—According to W. B. Connor Engineering Corp., 500 Fifth Ave., New York 18, its recently developed "Air Improver" has been found to be particularly successful in lavatory applications.

The device consists of a 3000 rpm motor driven blower which circulates 60 cfm of room air through two metal canisters containing 3 lb of activated carbon which is used to remove odors. The unit measures 18 in. in length, may be fastened at any convenient location, and does not change the air in any way except to remove impurities.

It is recommended as a simple and economical answer to air sanitation problems in offices, restaurants, hotels, grilles, clubs, theaters, etc., or any small space where ventilation may be lacking or impractical.



Left: Air Purifier; *Right*: Alarm

Smoke Alarm

HPAC 28—The model M smoke alarm of General Power Plant Corp., 381 Fourth Ave., New York 16, utilizes a light source and a photoelectric unit mounted on opposite sides of a breeching. When smoke density reaches a selected or preset value, a 4 in. diameter bell sounds and continues to ring until the smoke is reduced below the preset density. Failure of the lamp or phototube will cause the alarm to sound.

Recommended for coal, oil, or gas burning installations, it is offered for providing an instant warning of illegal smoke, and as a means of improving combustion efficiency.

Railway Car Temperature Control System

HPAC 29—A new electronic temperature controlling system, designed for quick and easy installation on all existing passenger cars and said to make possible steam savings up to 40 percent (because only a few feet of undercar piping is used), is now available from Minneapolis-Honeywell Regulator Co., 2604 Fourth Ave., S., Minneapolis 8.

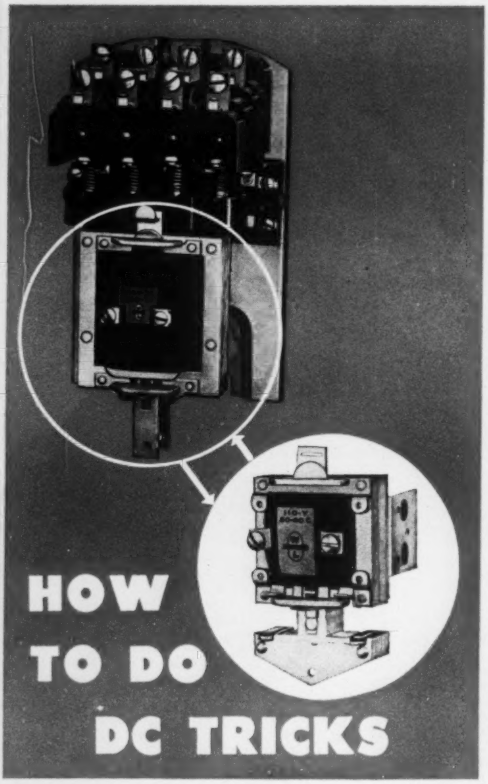
Only genuine RIDGID guarantees economy

If this Housing ever Breaks or Distorts we will replace it Free
RIDGID
HEAVY DUTY
14
This Work-Saver RIDGID assures you . . . "No pipe wrench housing repair expense."

● You'll find no substitute for the smart-working, long-lasting qualities that have made RIDGID the world's most popular pipe wrench. Breakproof housing, full-floating hookjaw with handy pipe scale, replaceable heeljaw, adjusting nut that spins easily in all sizes, 6" to 60", comfort-grip handle—these plus the RIDGID name mean more service and tool satisfaction for your money. Buy at your Supply House.

RIDGID

★ Work-Saver Pipe Tools ★



with AC Contactors and vice versa

Put a DC power plant in Ward Leonard's 4110 across-the-line AC magnetic starter, and you can

- ... do direct AC switching from DC battery voltages
- ... hold-in despite poor voltage regulation—down to 15% of rated voltage
- ... eliminate troublesome AC hum

Or use a DC contactor with an AC power plant (Ward Leonard designed the contactors for this) and—

- ... switch a variable-voltage DC control system from a constant potential AC source
- ... get dynamic braking just by adding a contact—rather than a separate contactor

Investigate Ward Leonard AC-DC combinations. Write for Control Catalog. WARD LEONARD ELECTRIC CO., 24 South Street, Mount Vernon, N. Y. Offices in principal cities of U. S. and Canada.

WARD LEONARD
ELECTRIC COMPANY
Result-Engineered Controls
RESISTORS • RHEOSTATS • RELAYS • CONTROL DEVICES
W L

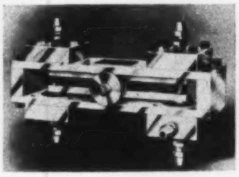
The system consists basically of one steam reducing valve per car and one motor driven heat valve which operates in response to an electronic thermostat. The system operates on the modulating principle and instead of using steam for the heating medium, the new method uses steam to heat hot water which is then piped through the car.

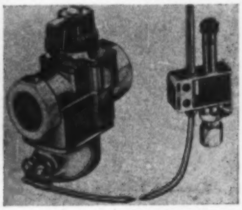
Pressure Ratio Totalizer

HPAC 30—Hagan Corp., Hagan Bldg., Pittsburgh 30, has developed the "Ratio Totalizer" which is designed to receive several control signals or pressures and to produce a single output loading pressure in any desired ratio to the incoming loads. It is pneumatically operated and can accommodate as many as three input loading pressures plus three spring forces in a single unit. The device is designed for use in computing circuits for such functions as addition, subtraction, multiplication, and division of control signals, and in control circuits for introducing proportional band action, rate action or automatic reset, either separately or in any desired combination.

The standard assembly consists of a bar stock steel frame with nonmetallic flexible diaphragm elements in each of four chambers. An adjustable fulcrum allows adjustment of output loading pressure, which may be in the ranges of 3 to 15 lb, 0 to 30 lb, or 0 to 60 lb.

According to the company, the totalizer has been successfuly applied in general process control, central station and industrial power plant regulation, aeronautical laboratory testing and in other fields which demand sensitivity, accuracy, and durable service. One specialized function to which the device has been applied is pneumatic toggle switching to produce an instantaneous rise in output pressure from zero to maximum value when input pressure exceeds a pre-set value. Another is selector action, in which output loadings equalling either the higher or the lower of two input loadings are produced to control fans to satisfy the demand of two types of burners.


Pressure Ratio Totalizer


Gas Valve and Pilot

Gas Cock Safety Valve and Pilot Burner

HPAC 31—A new MR-5, ¾ in. gas cock safety valve and the 260 series pilot burner are now available from General Controls Co., 801 Allen Ave., Glendale 1, Calif.

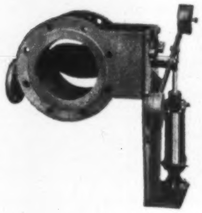
The pilot burner is designed on a smaller scale than its predecessors and incorporates a removable filter screen that assists in eliminating lint plugging. A special mounting bracket holds both the burner and the thermocouple in operating relation to each other.

Like other models of the company's safety type control valves, the new valve shuts off in the event of pilot flame failure.

Off Center Valve

HPAC 32—Manufactured by R-S Products Corp., 4600 Germantown Ave., Philadelphia 44, a new off center valve of the disc type is said to simplify the control of 15 psig saturated steam with a low pressure drop. The valve shown here, No. 780, is 8 in. in diameter and has 150 lb American Standard raised face flanges. A double crank arm with adjustable weights facilitates accurate setting. The cylinder is not an actuator but simply a dashpot. On the left can be seen a 2 in. flanged outlet for overload relief.

These disc type valves are available in smaller and larger sizes and for higher pressures. They are also used in air, gas, liquid and semi-solid service for the control and shutoff of volume and pressure.



Above: Refrigerant Charging Line

Left: Off Center Disc Type Valve

Refrigerant Charging Lines

HPAC 33—New refrigerant charging lines with "Kwik-Kuplers" at each end are offered by Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago.

Nuts are specially extruded with wide spaced corrugations for easy finger grip. A feature of the lines, says the manufacturer, is the fact that the seal gasket cannot be blown or dropped out accidentally, yet it is readily replaceable. It is stated that the hose is of exceptionally high quality, is noncollapsible and is impervious to common refrigerants. It has a special composition core, covered with four-ply woven fabric, with an outer covering of neoprene. These charging lines are said to withstand unusually high hydrostatic pressure and to be extremely flexible.

Three different lengths; 24, 30 and 36 in. are now available.

Packaged Steam Generators

HPAC 34—An electronic safety control for gas burners and an air interlock safety device to automatically control the flow of gas are among the new safety features of the packaged steam generators available from Clayton Mfg. Co., El Monte, Calif.

The electronic control furnishes electric ignition, proves the flame pilot, energizes the solenoid coil to pass gas to the burner, and stops the ignition spark after the burner is ignited. The control automatically returns to the first step, electric ignition. Safety shutdown occurs on either ignition failure or loss of flame.

The air interlock is a supplementary control on the main gas valve to prevent the flow of gas to the burner during an off cycle, or in the event of blower, electric current, or motor failure. The interlock will not allow the main gas valve to open if there is an excess of gas pressure.

Mueller Climatrol

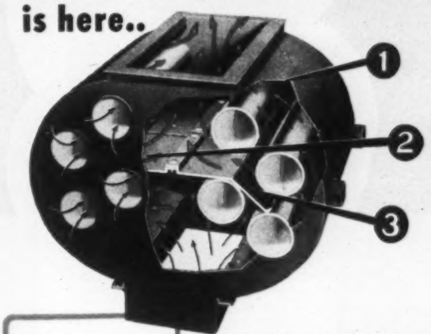
Gas Unit Heaters

(Propeller Fan or Blower Types)

Proof of

SUPERIORITY

is here..



❶ **One Piece — All welded Steel** — No tie-rod, bolted, gasketed, or slip joints to leak, separate, or crack.

❷ **Uniform air flow and heat distribution** — Even flow of air insures maximum heat transfer and fuel economy.

❸ **High Crown Sheet** — No flame impingement, no "hot spots". No joints or welds exposed to flame or path of flue gases.

MUELLER Climatrol Direct Gas-fired Unit Heaters fit any application, with both the Type 150 (propeller fan) and Type 151 (blower, not shown) to choose from. Each is AGA approved for all gases, and is available in four input capacities: 60,000, 90,000, 120,000, and 150,000 Btu.

With the Types 150 and 151 you can assure longer life, *plus* greater operating economy. And, you can deliver jobs faster because these units are *shipped assembled and pre-wired.*

Get behind the Types 150 and 151. Write for information . . . *L. J. Mueller Furnace Co., 2023A W. Oklahoma Ave., Milwaukee 15, Wisconsin.*

94th Anniversary

MUELLER — Climatrol

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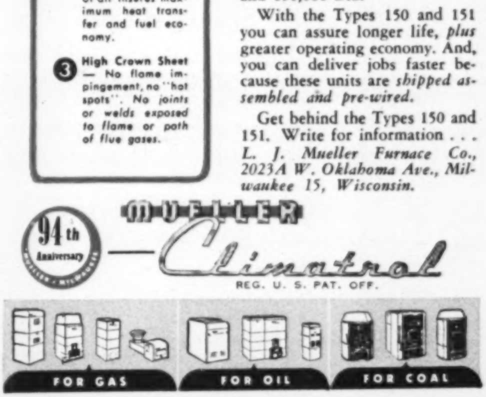


...AND FOR HELP WITH THE HEATING CONTROL, WE'LL TALK TO HONEYWELL!

We doubt that you've worked on many igloos lately. We haven't helped heat any, either.

But we *can* help architects and their heating engineers provide the proper thermal environment for any client – anywhere – in any kind of structure.

We have a lot of literature on the automatic control of all phases of heating, ventilating and air conditioning. Information you should have in your files.

And we have a lot of very well informed engineers – in our 87 different offices – who have a lot *more* information right at their finger-tips.

We sincerely believe we can help you on any project that poses problems of control of any kind – for *control* is Honeywell's business.

So, why not *talk to Honeywell?* Why not *write* to Honeywell for complete information on the equipment discussed in the column across the page? And why not do it *now?*

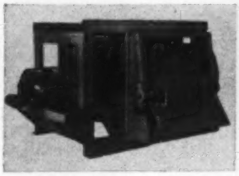
MINNEAPOLIS
Honeywell
First in Controls

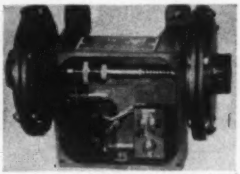
Steam generators are offered in 10, 15, 30, 50, 75, and 100 hp sizes, either gas or oil fired, or combination oil-gas.

Draft Fan with Barometric Damper

HPAC 35—L. J. Wing Mfg. Co., Linden, N. J., has developed a "Draft Inducer" for precise control of furnace draft.

Units are equipped with variable speed motors and can be equipped with integral barometric dampers. An important feature is the use of a hinged explosion gate to relieve any excessive pressures that may develop in the breeching, thus preventing damage to the heating system.


Draft Fan with Damper


Differential Pressure Control

Static Pressure, Vacuum Control

HPAC 36—The catalog III-D differential pressure or vacuum control of Coral Designs, Div. of Henry G. Dietz Co., 12-16 Astoria Blvd., Long Island City 2, N. Y., is a new addition to the company's static pressure controls. It is designed for use on low differential pressure where regulation is required in inches of water, either pressure or vacuum, and where a leak path between a diaphragm and atmosphere cannot be tolerated.

Two diaphragms are used, each having one side open to the atmosphere with the other side connected to the source of pressure or vacuum. Two discs attached to the ends of a single shaft actuate the microswitch. Standard ratings are from 0 to 20 in. of water pressure or vacuum with range adjustment and with fixed differentials from 0.2 to 2 in. of water.

Nonmetallic Refrigerant Hose

HPAC 37—Flexible, nonmetallic refrigerant hose assemblies, made by Resistoflex Corp., Belleville 9, N. J., now carry the stamp of the Underwriters' Laboratories re-examination service on four sizes. The manufacturer reports that, on the basis of tests, refrigerant assemblies with $1/4$, $3/8$, $1/2$ and $5/8$ in. inside diameters have been approved for factory installations in Class E systems where "Freon-12" or "Freon-22" is used as the refrigerant.

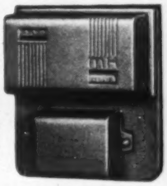
Because flexibility of nonmetallic construction is claimed to absorb vibrational and bending stresses, the manufacturer recommends these assemblies not only where vibration is experienced, but also where refrigerant lines are subjected to continual flexing. According to the company, the "Compar" refrigerant tube, which is reinforced by a carcass of integrally bonded braids and a synthetic cover, is impervious not only to "Freons" but also to methyl chloride, and is unaffected by compressor oil within the system. Lines are being offered as complete assemblies.

They won't help you heat igloos, but they will help you on many other problems of control—so write us now for these

Facts you need—*FREE!*

Just check space opposite equipment you're interested in, fill in your name and address and mail this column to us. We'll get your facts to you promptly.

Weatherstat systems *tend to eliminate underheating and overheating.* These sensitive instruments compensate for such variable factors as sun, wind, air temperature, etc. Thus, they meter heat in direct proportion to need—*provide uniform comfort at lowest possible fuel cost.* Available in on-off, or modulating systems. Check here for 16-page booklet. ☐



Pin-point temperature control *in pneumatic systems* is now possible—thanks to this new Automatic-Reset Pneumatic Relay. Virtually eliminates offset, hunting and cycling in pneumatic systems. In comfort applications, guarantees maintenance of desired temperatures, even in severest or mildest weather. Check here for free folder. ☐

Hospital Thermostat *with "Nite-Glowing Dials"*—first thermostat ever designed specifically for hospital needs. Luminous dials glow in the dark and are easy to read without lights. No electrical connections required. Magnified indicators. New speed-set control knob, camouflaged against tampering. Simplified design eliminates frequent adjustment. Check here for 12-page booklet on hospital temperature control. ☐

MINNEAPOLIS-HONEYWELL REGULATOR CO.
Minneapolis 8, Minnesota, Dept. HP-1-07

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A COMPLETE LINE
OF DEPENDABLE, ALL WELDED

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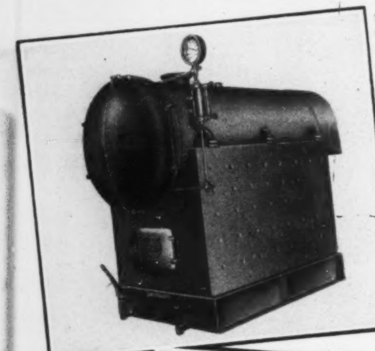
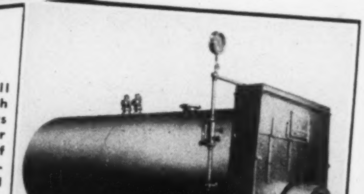
BOILERS

*IN SIZES AND RATINGS TO
FIT EVERY REQUIREMENT*



Titusville All Welded, Compact Steel Boiler—provides economical combustion for all fuels. ASME constructed, SBI rated.



Titusville All Welded Scotch Heating Boilers—available for all types of fuel. ASME constructed, SBI rated.

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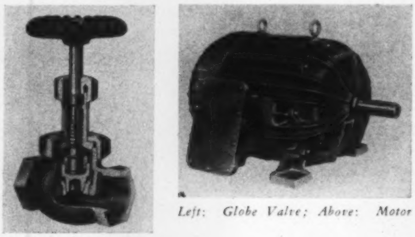
DIVISION OF STRUTHERS WELLS CORPORATION
TITUSVILLE, PENNSYLVANIA

Bronze Globe Valve

HPAC 38—Completing its line of "Micro-Control" valves, Fairbanks Co., 393 Lafayette St., New York 3, has introduced the Fig. 0525, 150 lb bronze globe valve.

The stainless steel plug disc and seat are heat treated to a hardness of 500 Brinell, are manufactured as a unit, and are ground. They may be reground, and replacement discs and seats are available in matched sets. The two-piece union bonnet and its component, the radial seat, are said to insure a perfect body bonnet joint, rigid alignment of all parts, and easy access to plug disc and seat for regrinding or replacement.



Left: Globe Valve; Above: Motor

Explosionproof Motors

HPAC 39—Crocker-Wheeler Div., Elliott Co., Ampere, N. J., has developed a line of explosionproof motors approved by the Underwriters' Laboratories for Class I, Group D; Class II, Group F; and Class II, Group G hazardous locations.

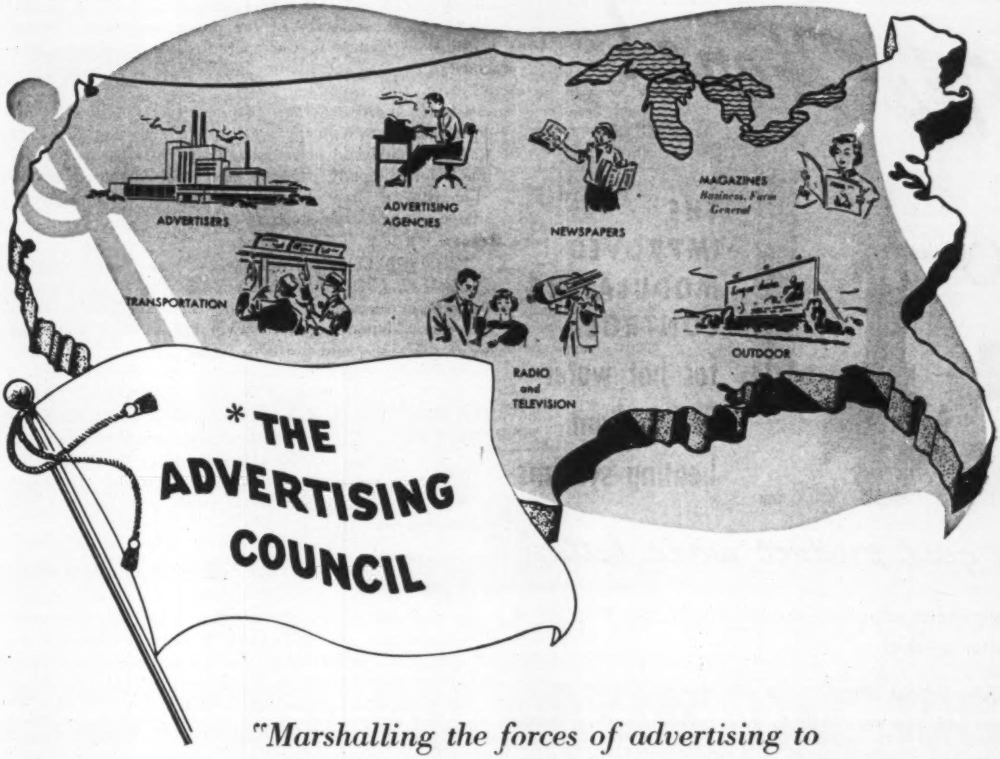
Of the totally enclosed fan cooled design, the motors are especially recommended for service in refineries, chemical plants, grain elevators, or wherever explosions are a hazard. They are an adaption of the "Sealedpower" design with cooling air directed by an external fan over fins which are an integral part of the grey cast iron frame.

WE HEAR THAT

A recently announced merger involves *C. H. WHEELER MFG. CO.*, Philadelphia, and *ECONOMY PUMPS, INC.*, and *KLIPFEL VALVES, INC.*, both of Hamilton, Ohio. No change at the present time in personnel or operation of any of the companies is planned. Parent corporation of the three companies is *HAMILTON-THOMAS CORP.*, Hamilton, Ohio.

ALUMINUM CO. OF AMERICA, Pittsburgh, is engaged in two major programs which will boost the company's production of aluminum by more than 25 percent annually. The first, a "quick action" plan, involves the use of standby facilities owned by the company and which require the use of higher-cost electric power than is economical for peacetime smelting of aluminum. The second phase is an expansion plan which calls for enlarging smelting facilities and the construction of a new plant utilizing electric power generated from gas or coal fuels.

R-S PRODUCTS CORP., Philadelphia, has been purchased by *S. MORGAN SMITH CO.*, York, Pa. The present management of R-S Products will be retained along with the present five-man board of directors; however, the Smith Co. will provide two additional board members—



"Marshalling the forces of advertising to help solve national problems and to make democracy work better..."

DO YOU KNOW that the forces of advertising are engaged today in one of the world's greatest jobs of mass education ... *in the public interest?*

Do you know that these forces for good have been released through the vision and unselfish cooperation of American business — advertisers, advertising agencies, media owners and others?

Hundreds of advertising agencies have volunteered their planning and creative time and facilities. Artists, cartoonists, photo-engravers, printers, typographers and others have contributed their services.

Media owners have donated millions of dollars in space and time. National and local advertisers have sponsored and paid for many millions of public service advertising messages.

As a result, the American people are being alerted as never before to the dangers which threaten from within and from without ... the dangers of ignorance about our American economic system, intolerance, tuberculosis, school and teacher shortages, etc.

And, at the hub of this great public service effort is *your* organization ... The Advertising Council.

Advertisers and Media Owners... Your Help is Needed!

Right now The Advertising Council has 14 programs in operation. The success of these programs depends on the public spirited and generous cooperation of advertisers and media owners. *Your* help, in the form of space or time donations, will mean a lot to us. And remember ... *What helps America helps you!*

Yours for the Asking

Write for a copy of Booklet No. 15. It will give you pertinent information about The Advertising Council ... how it started ... what it is ... what it does ... Or ask for material on specific campaigns. Address: — The Advertising Council, 25 West 45th Street, New York 19, N. Y.

THE ADVERTISING COUNCIL
What it is
What it does

Heating, Piping & Air Conditioning
6 North Michigan Avenue
Chicago 2, Illinois

*A NON-PROFIT ORGANIZATION FORMED TO UTILIZE ADVERTISING IN THE PUBLIC GOOD

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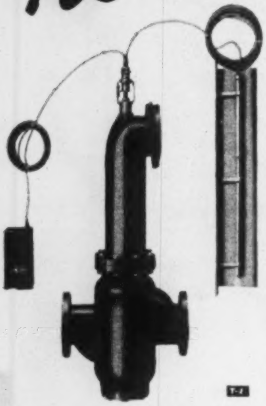

THE IMPROVED MODULATING CONTROL for hot water and radiant heating systems

a good product made better—

Sarcotherm engineers are constantly searching for a better product.

While utmost simplicity is still the dominant design principle, the new models now available show many important improvements and refinements.

Double Seated Valves are now used in the larger sizes, greatly increasing valve capacity and permitting smaller valves being used on a given size job. *Convenient manual adjustment* features are now provided in a variety of combinations. *Program control systems* are available to meet any specification.

Easy Installation. New body construction simplifies piping and allows for easy servicing.

Hundreds of successful installations testify to the efficiency of this simple system. Our Engineering Department will be glad to recommend a suitable control system for your particular job.

Ask for new Bulletin ST-501 describing latest improvements.

19A

Sarcotherm

SARCOTHERM CONTROLS, INC. • Empire State Bldg. • NEW YORK 1, N. Y.

BURWELL B. SMITH, vice president, and *DUNCAN D. McARTHUR*, secretary of the parent company. There will be no change in the operation of the Philadelphia concern.

JAS. P. MARSH CORP., Skokie, Ill., has built a 17,000 sq ft addition to its manufacturing plant. Though the plant was completed and occupied only recently, increased demand for company products and the acquisition of the "Electrimatic" line of refrigeration controls have necessitated the new expansion.

JOHNSON CORP., Three Rivers, Mich., has appointed *THERMAL INDUSTRIAL ENGINEERING CO.*, Denver, district representative. Territory to be covered includes Colorado, Montana, eastern Wyoming, western Nebraska, western Kansas, and northern New Mexico.

The New York offices of *W. B. CONNOR ENGINEERING CORP.*, Danbury, Conn. are now at 500 Fifth Ave., New York 18. ....Ground was recently broken for the new million dollar Duncansville, Pa., plant of *NATIONAL RADIATOR CO.*, Johnstown, Pa. The plant will be devoted to sheet metal fabrication and is to be completed next April.

INGERSOLL STEEL DIV., BORG-WARNER CORP., Chicago, has been separated into two distinct and independently operated units. One unit, which will continue to be known as the Ingersoll Steel Division, is headed by *HAROLD G. INGERSOLL*, president and general manager. *ROBERT S. INGERSOLL*, is president and general manager of the other unit known as *INGERSOLL PRODUCTS DIV.* The growth of business and dissimilarity of many of its present-day products are the reasons for this move.

Some 200 million pounds of increased aluminum capacity will be brought into production by *REYNOLDS METALS CO.*, Louisville, Ky., by 1952. ....*KAYLO DIV., OWENS-ILLINOIS GLASS CO.*, Toledo, has appointed *REILLY-BENTON CO. INC.*, New Orleans, distributor of its heat insulation for the area of Louisiana and Mississippi. The New Orleans firm is a wholesale distributor of insulation materials and accessories and is not engaged in application work.

Sales representatives of *MITCHELL MFG. CO.*, Chicago, recently met at the Stevens hotel, Chicago, where the company's products for this year were announced and sales plans were outlined. .....*MAID-O'-MIST, INC.*, Chicago, is building an addition to its factory so as to increase production space approximately 25 percent.

GARDNER-DENVER CO. has established a new plant at Brantford, Ontario, which is operated by Gardner-Denver Co. (Canada) Ltd. Key production men will be temporarily transferred from the parent plant at Quincy, Ill., to provide the necessary initial supervision.

The one-billionth pound of aluminum produced by *KAISER ALUMINUM & CHEMICAL CORP.*, Oakland, Calif., was recently poured at its Mead reduction plant in Spokane, Wash. At the same time, construction was

ARRANGEMENT NO. 1 FANS ▶▶▶

Supplied in both Forward and Backward-blade types, single-inlet, single-width only for exhausting air impregnated with dust, fumes, lint, etc. Arrangement 1 fans are built without obstruction in the inlet, and allow the free passage of air. Specially constructed to handle air at higher temperatures than that of standard air.

◀◀ ARRANGEMENT NO. 3 FANS

Arrangement 3 Fans: for all types of ventilating systems Supplied in both Forward and Backward-blade types of single inlet, single width construction, or double inlet double width construction. Capacities range from 200 cfm to 250,000 cfm.

The heavier construction of classes II, III and IV cover the particular needs of special applications.

Engineering Offices In All Principal Cities.

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Bulletin SC-104

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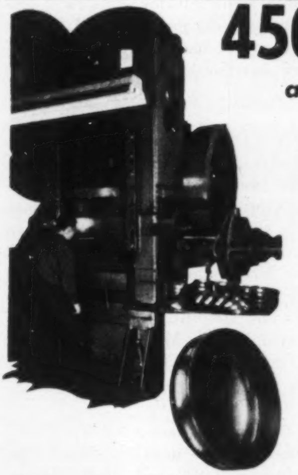
GENERAL BLOWER CO. **8610 Ferris Ave., Morton Grove 12, Illinois**
Direct Chicago Phone COrnelia 7-4400.

450-TON PRESSES LIKE THIS

are a part of the equipment used to make

BASEBOARD AUTO-RAD RADIATION



The tremendous facilities required for manufacturing AUTORAD Finned Radiation are more than ample for all reasonable trade requirements. Production facilities are available as well for the prompt and experienced handling of Government orders.

These mammoth presses, with capacity to form and punch heavy work of large dimensions, are but part of the equipment used by AUTORAD, INC. in the manufacture of Baseboard Radiation. In every department special machines are available for the fast and economical manufacture of finned pipe and enclosures.

Back of a well equipped plant are 30 years of experience and know-how in the design and manufacture of heat transfer equipment. For more than a quarter of a century AUTORAD has paced the industry in improvements in engineering and production.

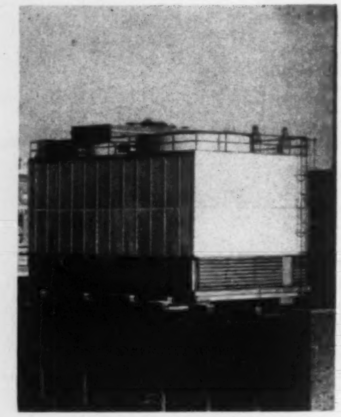
You can be sure, therefore, when you sell AUTORAD you are selling and installing equipment which will give utmost satisfaction.

Write for Form AR-101 and
Bulletin 50

AUTO-RAD
Inc.

Manufacturers of Heat Transfer Equipment Since 1920
3535 Fillmore St., Chicago 24, Ill.

NEWS ITEM!*



* This is another Phillips Tower erected on 24th floor level of the Fashion Center Building at 525-7th Ave., in N.Y. City.

It is a part of the chilled water circulating system designed and installed under the supervision of Erik Roos of Kimball & Roos, mechanical engineers with offices in the Grand Central Terminal Building, N.Y. City.

Having in mind the necessity of keeping maintenance costs at a minimum Mr. Roos specified that the cooling tower should be constructed of corrugated transite siding on a frame of structural steel, hot dipped galvanized after fabrication.

This tower has two unequal cells of 1000 and 2000 G.P.M. respectively to give flexible and efficient operation thruout the air conditioning season.

The tower was fabricated in the Phillips plant in Brooklyn within sight of the mid-Manhattan area. All fabrication, rigging and erection was performed by Phillips personnel.

Phillips Towers are also available in all sizes (ABOVE 15 TONS) in transite, California Redwood, or All-Steel Construction.

Phillips
Cooling Tower Co., Inc.
220 DUPONT ST., BROOKLYN 22, N. Y.

stepped up at Spokane to expand future primary aluminum pig production by approximately 16 percent.

EUTECTIC WELDING ALLOYS CORP., New York, is constructing a new engineering services building at the site of the company's new plant in Flushing, L. I. The new structure, which includes laboratory facilities, climaxes the company's first decade in business and reflects the expansion of its activities.

Now under construction for *AIR REDUCTION CO., INC.*, New York, is a manufacturing plant at Union, N. J. The new plant, providing for the employment of approximately 800 persons, will be used by the company's *AIRCO EQUIPMENT MFG. DIV.*

CHELSEA FAN & BLOWER CO., Irvington, N. J., has moved its general offices and plant to Plainfield, N. J. The move was made to increase production capacity more than 400 per cent and to provide a new laboratory.

H. K. PORTER CO., INC., Pittsburgh, has formed *JARECKI VALVE DIV.*, Tulsa, Okla., to handle the manufacture and sale of valves formerly produced at the Jarecki Mfg. Co. plant in Erie, Pa. These valves will now be produced in Porter's *HINDERLITER TOOL CO. DIV.* plant in Tulsa.

NELSON STUD WELDING DIV., MORTON GREGORY CORP., Lorain, Ohio, is increasing its floor space and manufacturing capacity by 50 percent. The program includes additions to stud manufacturing equipment and the installation of facilities for the production of ferrules which have heretofore been purchased. The company is also establishing its own warehouse in the San Francisco area.

OLIVER J. PRENTICE, 601 Diversey, Chicago 14, formerly director of publicity and public relations for C. A. Dunham Co., has been a speaker at various national and regional conventions for many years. He is a member of the public speakers bureau of the Chicago Association of Commerce and Industry and has prepared a leaflet describing his lectures of an inspirational or humorous nature which have been prepared for presentation before clubs, sales and advertising groups, associations, etc. Subjects listed include My Country, a Tour of the Underworld, Times Have Changed, Sparks of Laughter, and B.V.D.'s.

PYLE-NATIONAL CO., Chicago, has named *MIDWEST EQUIPMENT CO.*, Omaha, sales representative in the industrial field for Nebraska, Iowa, and South Dakota. Branch offices are maintained in Davenport and Des Moines, Iowa.

SCOVILL MFG. CO., MILL PRODUCTS DIV., Waterbury 20, Conn., is a producer of copper-base alloy condenser tubes for many services. In order to more clearly visualize some of the conditions under which such tubes serve, the company has constructed a glass model liquid-to-liquid heat exchanger which is used to demonstrate, by the use of colored fluids, typical flow patterns of

Graduate

ENGINEERS

GOOD OPPORTUNITIES for

POWER ENGINEERS: Must have five to fifteen years experience in some of the following: operating, testing and maintaining power plant equipment, supervising power plant operations, making cost and evaluation studies, heat balance work, power cost accounting, design and layout of power plants, and the selection and installation of power equipment. Must be graduate.

AIR CONDITIONING ENGINEERS: At least 7 years' experience in selection and operation of heating, air-conditioning, ventilating and refrigeration equipment. Well versed in the theory of thermodynamics, fluid flow and heat transfer. For consulting evaluation, and economic operation services. Must be graduate.

MAINTENANCE ENGINEERS: Five to ten years in planning maintenance work, establishing manpower and material requirements, scheduling and controlling work. Must be thoroughly familiar with Machine and Hand Tools used in Plant Maintenance Work. Must have supervised persons doing maintenance work. Must be graduate. For consultation work.

HEATING AND VENTILATION ENGINEERS: Eight to ten years progressively difficult experience in field and office problems in heating, ventilating and air-conditioning design. Also, experience in making economical evaluation of alternate methods. Must be graduate.

Give experience, education, age, references, personal history, salary received and salary expected. Please be complete and specific.

All inquiries will be considered promptly and kept confidential.

E. I. du Pont de Nemours & Co. (Inc.)

Engineering Department Personnel

Wilmington 98, Delaware.

D.I.P.
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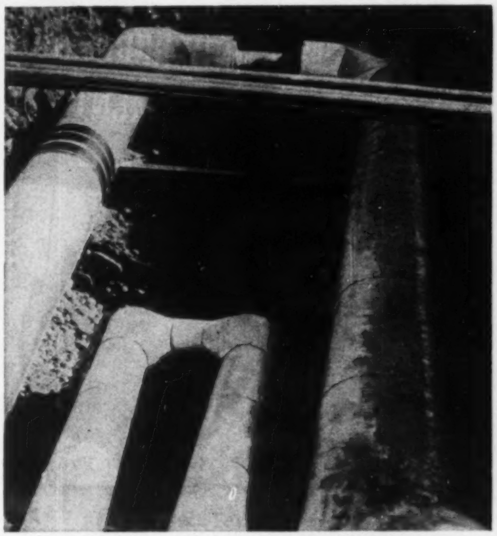
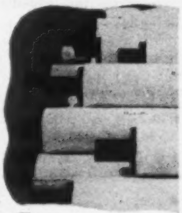
Pre-Sealed Protection Built-In at Factory



- and Low Cost Installation Saves Time, Trouble and Work

Wherever you have a problem of conveyance of hot-water, steam or refrigerants, you can specify DURANT INSULATED PIPE with complete confidence in securing long range economy.



The combination of the best quality moulded insulation completely protected by non-porous asphalt merits the preference of architects, engineers, and contractors who have investigated the scientifically engineered construction methods employed in the fabrication of D. I. P.

Economy starts with installation. D. I. P. requires no tile, masonry, or sub-drains. Field joint work is simple, yet corrosion and electrolysis are eliminated. Low maintenance costs result in further economy over long years of dependable service.

Complete detailed information and engineering data on standard piping and special fittings will be furnished on request. Our representatives in principal cities are at your service.

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DURANT INSULATED PIPE COMPANY
1015 Runnymede St. East Palo Alto, California

REPRINTED FROM Business Week
"UNDERGROUND MOVEMENT" under control
The Heat's On

Badger expansion joints help N. Y. Steam Corp. cut maintenance on about 75 miles of steam lines

When a Gothamite wants steam — unlike water — there's no shortage. New York Steam Corp. provides it instantly. From Battery to 92nd Street this gigantic system — the world's largest — at peak loads can serve over 10,000,000 pounds of steam per hour to about 3,000 Manhattan buildings. (See "The Heat's On in New York," Business Week, Jan. 14, '50)

Maintenance costs could easily get out of hand in such a vast underground system. Best protection? — The best equipment. And in Expansion Joints that means Badger. Since the early 1900's New York Steam Corp. has installed thousands of these famous joints — and maintenance costs have been kept to a minimum.

These construction features on Badger Joints can cut your costs too:

- **Directed-flexing rings . . . equalize stresses *between* and *within* corrugations**
- **Packless . . . pressure-tight single tube**
- **Compact . . . no larger than flanged fitting**
- **Special forming . . . no structure-weakening stresses**
- **Controlled heat treating . . . assures long life**
- **Fabricated from copper for normal pressures and temperatures, stainless steel or alloys to withstand high pressure, temperature and corrosion**

How about your expansion joint problems? Are you getting less than the best in performance? . . . In low cost operation? Then there's good news for you in the Badger story — write for details today.

Badger MANUFACTURING COMPANY
230-260 BENT STREET CAMBRIDGE 41, MASS.

liquids inside and outside of tubes. Air is entrained to make visible the flow which is not apparent when gas-free liquids are circulated.

An experimental a-c drive for railroad car air conditioning, built by *WESTINGHOUSE ELECTRIC CORP.*, P. O. Box 868, Pittsburgh 30, has been undergoing trials in regular car service on the Chicago, Rock Island & Pacific Railroad. The power plant consists of an engine direct coupled to a 30-kva alternator and mounted as a package unit under the car. Two standard 5 hp hermetic motor driven compressors, operating in separate refrigerant circuits, are also built as a single, under-car package. The condenser, combined with the engine radiator, is mounted under the car as a package and evaporators and heating coils of essentially standard design, but specially shaped, are mounted within the coach.

"Keps" fastening units consist of pre-assembled nuts and "Shakeproof" lock washers. They are designed to provide for attachment of lock washers and yet conform to accepted nut standards. The washers used are of the external toothed type and are free to rotate but cannot drop off. The manufacturer is *SHAKEPROOF, INC., DIV. OF ILLINOIS TOOL WORKS*, 2501 N. Keeler Ave., Chicago 39.

PANTEX MFG. CO., Pawtucket, R. I., has developed a new cartridge type, hydraulic pressure electric switch. Designed for control of electric circuits by means of hydraulic pressure actuation, the unit is said to cut in and cut out electric circuits with as little as 12 to 18 percent pressure differential and to be unaffected by extreme pressure surges and wide temperature differentials. Designed to withstand mechanical or hydraulic shock, the device is said to be light weight and silent.

ATLANTIC STEEL CO., Atlanta, has formed a product engineering department to stimulate sales and to provide consulting type assistance in regard to product design, plant layout, fabrication problems, metallurgical problems, etc. *F. A. TEEPLE, JR.*, superintendent of the company's manufactured products division, has been named manager of the new department.

To heat buildings where furnace space is at a premium, *QUIET AUTOMATIC OIL BURNER CORP.*, 33-35 Bloomfield Ave., Newark 4, N. J., is offering a compact warm air furnace which can be suspended from a ceiling or placed on the floor. The furnace is insulated with fiber glass and the heater body is of 12 ga steel with a radiator section. The combustion chamber is built-in and precast. A motor driven blower and removable filter are incorporated and these oil fired units are available in capacities from 85,000 to 240,000 Btu per hr.

The "Speech-Master" of *LESLIE PRODUCTS CO.*, 12002 Lansing Ave., Leslie, Mich., is a portable amplifier weighing 12 lb and is recommended for use in speaking to a large group, particularly in the field. According to the manufacturer, it is invaluable for programs such as field days, picnics, plant or sightseeing tours, etc.

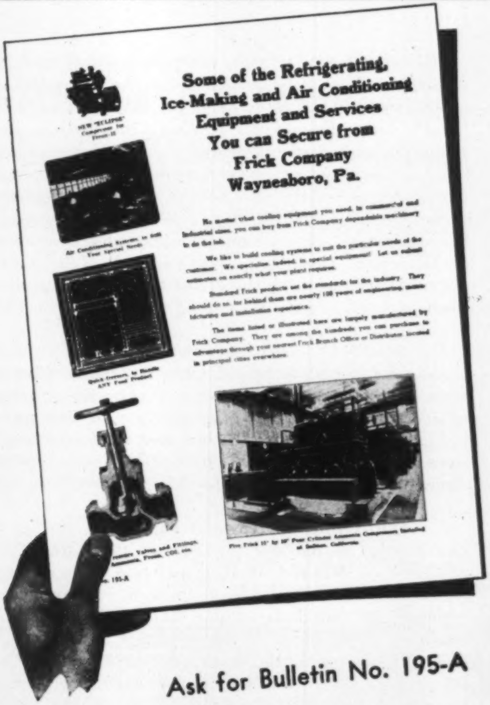
ATTENTION!

If you are a PRIME DEFENSE CONTRACTOR and need an additional source for any of the following fabricated steel items contact us immediately.

- Special plate fabrication up to 1" thickness.
- A.S.M.E. Code vessels, carbon or alloy steels.
- Power plant equipment — Flues and Ducts, Cable Pans, Breechings and Stacks.
- Process Stills, storage vessels and tanks.
- Sheet metal fabrication from 20 Ga. to 3/16".
- Special process equipment for chemical industries using stainless and carbon steels.
- All types of assemblies using modern welding equipment.
- Hot Water Heaters — All sizes.
- CLIFF Boilers — Low Pressure Heating — All types and sizes.

Remember — WE HAVE THE PLANT, THE EQUIPMENT AND THE ENGINEERING FACILITIES.

TERRE HAUTE BOILER WORKS CO., 1140 CRAWFORD ST., TERRE HAUTE, INDIANA



Some of the Refrigerating, Ice-Making and Air Conditioning Equipment and Services You can Secure from Frick Company Waynesboro, Pa.

Ask for Bulletin No. 195-A

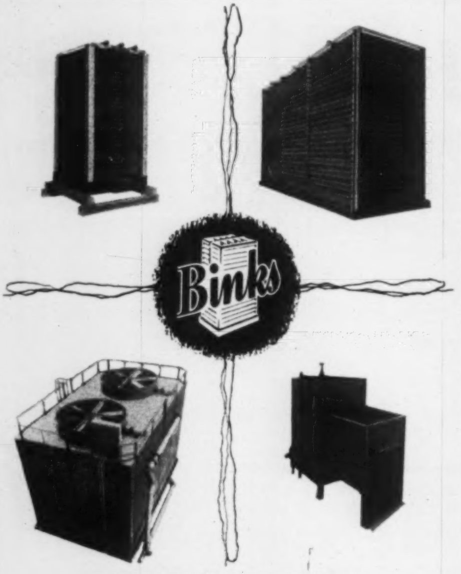
Get This New Bulletin!

It has nearly 70 photographs and drawings of equipment you can use in solving your cooling problems. And a complete check list of ALL the items you may need.

This has been wanted for a long time. Designers, owners, and operators are enthusiastic about it. Get your complimentary copy now: it will help you order equipment wisely. Write, wire or phone

DEPENDABLE REFRIGERATION SINCE 1882
FRICK CO.
WAYNESBORO, PENNA. U.S.A.

Also Builders of Power Farming and Sawmill Machinery



ADVANCED DESIGN

Cooling Towers

OF ALL SIZES AND TYPES

Binks cooling towers are engineered to give you maximum heat transfer…to save you money on purchase, erection, operation and maintenance costs. They slash your cooling water bills to zero.

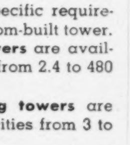
With hundreds of standard Binks towers from which to choose, you can meet specific requirements without the expense of a custom-built tower.

Binks natural draft cooling towers are available in many sizes with capacities from 2.4 to 480 tons of refrigeration.

Binks mechanical draft cooling towers are made in several models with capacities from 3 to 1000 tons of refrigeration.

Thousands of Binks towers, operating under widely varied conditions, have proved their superiority in cooling water from refrigeration and air-conditioning compressors and water jacketed engines; also for efficient cooling of fluids in food and chemical processing, and manufacturing applications.

Send today for engineering data sheets which will help you select the correct cooling tower for any particular application. Please state the size and type of tower in which you are interested.



THERE IS A BINKS TOWER FOR EVERY COOLING JOB

Binks MANUFACTURING COMPANY
3118-38 Carroll Ave., Chicago 12, Ill.
REPRESENTATIVES IN ALL PRINCIPAL CITIES

WHO'S WHAT

BAKER REFRIGERATION CORP., South Windham, Me., has elected *FREDERICK W. SMITH* president. He joined the company a year ago as vice president in charge of sales and last August was named executive vice president. He was previously associated with Frigidaire Div., General Motors Corp. and Carrier Corp. *HARVEY GAYLORD*, acting president for the past year, will continue to serve on the executive committee but will devote his full time to Bell Aircraft Corp., for whom Baker produces various parts. For the 11 month period which ended November 30, Baker's volume of refrigeration and air conditioning business increased 49 percent over the same period in 1949.

VIRGIL A. GOOD, who has been with *BURNHAM CORP.*, Boiler Div., Irvington, N.Y., since 1927 and who has been general sales manager since 1938, is now director of sales and manager of research and product development. *HAROLD N. JONES*, formerly eastern sales manager of the plumbing and heating division of Montgomery Ward & Co., is the new general sales manager and *HARRY J. CLARK*, until recently New York branch manager for Modine Mfg. Co., is now in charge of the New York office.

PROF. BURGESS H. JENNINGS, chairman of the mechanical engineering department, Northwestern University, has been awarded the 1950 Richards Memorial Award for outstanding achievement in mechanical engineering. The presentation was made at the recent annual meeting of the *AMERICAN SOCIETY OF MECHANICAL ENGINEERS.*

PAUL B. CHRISTENSEN, vice president and chief engineer, Merchants Refrigerating Co., is the new president of the *AMERICAN SOCIETY OF REFRIGERATING ENGINEERS.* He succeeds *JOHN G. BERGDOLL, JR.*, vice president and general works manager of York Corp. Other officers guiding ASRE activities this year include vice presidents — *EDWARD SIMONS*, consulting engineer of San Francisco, and *DR. R. C. JORDAN*, acting head of the department of mechanical engineering, University of Minnesota; treasurer — *DONALD K. TRESSLER*, scientific director of the Quartermaster Food & Container Institute.

E. L. MURRAY, district manager of the valve division, *OHIO BRASS CO.*, Mansfield, Ohio, has retired after 38 years of continuous service. ……. The new director of laboratories of *GLOBE STEEL TUBES CO.*, Milwaukee, is *ELMER GAMMETER*. He had been chief metallurgist since 1943 and succeeds *DR. H. K. IHRIG*, who has resigned to accept a position with Allis-Chalmers Mfg. Co.

J. CALVIN BROWN, engineer and patent attorney of Los Angeles, is the new president of the *AMERICAN SOCIETY OF MECHANICAL ENGINEERS.* He succeeds *JAMES D. CUNNINGHAM*, of Chicago. Newly elected regional vice presidents include *HENRY R. KESSLER*, manager, Republic Flow Meters Co.; *STEPHEN D. MOXLEY*, vice president, American Cast Iron Pipe Co.; *DR. JOHN T. RETTALIATA*, dean of engineering, Illinois Institute of Technology. *HAROLD E. MARTIN*, district

2-WAY CHOICE of operating method greatly increases utility of Ramset Dual-Action Tool for instantaneous fastening into steel or concrete — with just a *TURN*... or a *TAP*.

ALL-STEEL CONSTRUCTION, of extra thick, precision machined, aircraft quality steel, adds years of economical, dependable performance.

NEW ROTO-SET SAFETY SHIELD adjusts in ten seconds to any of seven positions; permits easiest, most accurate positioning of fasteners.

FASTER, EASIER FASTENING

with improved Ramset Dual-Action

You'll be time and money ahead, using RAMSET SYSTEM for fastening work in steel, concrete, masonry. Cutting time by as much as 90%, and costs by as much as 75%, RAMSET pays big dividends to thousands of users. With the improved RAMSET DUAL-ACTION TOOL, benefits are greater than ever before.

Ask for demonstration on your own work

Your local Ramset Specialist will *"Ramset"* a sample job for you, without cost or obligation. He'll show you the wide line of RAMSET FASTENERS, engineered to meet your most exacting needs. He'll prove Ramset's economy, speed and convenience on tough or easy fastening jobs. And, he'll help you find the surest, fastest, lowest-cost methods of doing especially unusual work. Ask for details and proof. *Ramset Fasteners, Inc., 12117 Berea Road, Cleveland 11, Ohio.*

Ramset Fastening System
Pioneer in powder-actuated fastening

THERMOBLOC

THE MOST *Adaptable...* *Complete Line* OF SELF-CONTAINED • DIRECT-FIRED HEATERS ON THE MARKET!

All the essentials of a heat producing unit are contained in THERMOBLOC'S smartly styled casing. THERMOBLOC model 300 is shipped complete, ready to hook up fuel and power lines and operate. Models 550 and 1000 are shipped in pre-assembled sections, easy to erect. THERMOBLOC occupies the smallest floor area per btu and its "straight through" design provides a flexibility of applications not possible with other types of heating devices.

The THERMOBLOC line is available in five different sizes . . . a complete line to meet any application:

THERMOPAC TYPE

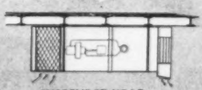
Model 100—Output 100,000 btu's/hr., 24" long, 24" wide, 66" high
Model 200—Output 200,000 btu's/hr., 28" long, 28" wide, 72" high

THERMOBLOC TYPE

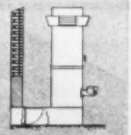
Model 300—Output 300,000 btu's/hr., 30" dia., 7'6" high
Model 550—Output 550,000 btu's/hr., 30" dia., 10' high
Model 1000—Output 1,000,000 btu's/hr., 44" x 70" by 9'7" high

The Prat-Daniel Corporation, manufacturers of THERMOBLOC offer a new technical bulletin to aid you in estimating your heat losses. Write for your copy today!

FILTERED AIR—For use where large quantities of dust are present, such as woodworking shops

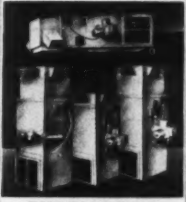


SUSPENDED HEAT—Where necessary, THERMOBLOC can be hung on roof trusses

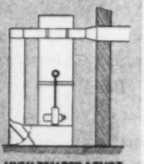


TEMPERING MAKE-UP AIR—Adjustable for 100% make-up air or 100% recirculation

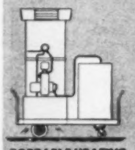
GARAGES and TERMINALS—Where inlet requirements are a minimum height from floor



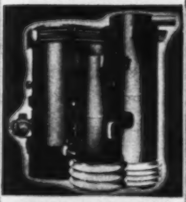
THERMOPAC



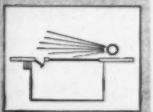
HIGH TEMPERATURE—With recirculation duct for drying processes



PORTABLE HEATING—Mounted on steel truck



THERMOBLOC



DOOR CURTAIN—To warm air entering through large open door

THERMOBLOC DIVISION
PRAT-DANIEL CORPORATION
Manufacturers of Prat-Daniel Power Equipment
70-1 WATER ST. **E. PORT CHESTER, CONN.**

BEND COLD
PIPE QUICKLY,
EASILY...
RIGHT ON
THE JOB!

with a GREENLEE HYDRAULIC BENDER

Yes, make pipe bends "right on the job" . . . exactly where and when you need them! And do the job swiftly, accurately with a GREENLEE Hydraulic Pipe Bender.

Bends pipe up to 4½". Simple to operate, easy to carry, set up and shift from job to job. With a GREENLEE *one man* makes smooth, precise, uniform bends in but a few minutes. Speeds your piping installations, cuts costs on labor and materials. In timesavings alone, the GREENLEE pays for itself quickly.

Ideal for radiant heating jobs, too. For complete details write for free Bender Booklet E-201. Greenlee Tool Co., Division of Greenlee Bros. & Co., 2341 Twelfth Street, Rockford, Illinois.

TOOLS FOR CRAFTSMEN
GREENLEE

manager, Babcock & Wilcox Co., is a newly elected director-at-large, as is *LIONEL J. CUCULLU,* assistant to the chief engineer, New Orleans Public Service, Inc.

ELDON E. FOX, formerly with the advertising firm of Young and Rubicam, Inc., is now advertising manager of *MINNEAPOLIS-HONEYWELL REGULATOR CO.*, Minneapolis. In the company's commercial division, *R. H. JACOBS* has been transferred to the home office to take charge of market development activities, and *RALPH CRYSLER* is managing the division's technical group.

Other promotions for members of the M-H sales departments are: *R. M. LOCKE* to assistant sales manager, wholesale division; *J. C. DORSEY*, sales manager, manufacturers' division, mid-Atlantic region, Philadelphia; *H. S. GRAY*, sales manager, wholesale division, midwest region, Chicago; *W. E. DOBIE*, sales manager, wholesale division, eastern region, New York; *R. G. HAYES*, sales manager, wholesale division, mid-Atlantic region.

C. E. BUCHOLZER is the new president of *AIRTEMP DIV., CHRYSLER CORP.*, Dayton, Ohio. He succeeds *W. C. NEWBERG* who has been made vice president and a director of the corporation's Dodge Division. Mr. Bucholzer has been with Airtemp 14 years and last year was named assistant to the president, then vice president and a director.

Other recent Airtemp personnel changes include the appointment of *FRED J. LAUGHNA*, Chicago regional manager, as administrative assistant to the vice president. *HOMER D. DAY*, former Boston manager, is now in charge of the Chicago region, and *TAYLOR U. COWGER*, special representative in the Dallas territory, is now managing the Boston region. *CHESTER E. SHONTZ* is now a field engineer in the Detroit area, and *STUART V. BORTHWICK* is district representative in the Cleveland region.

J. J. THOMPSON has been named manager of the sales personnel and training division of *WORTHINGTON PUMP AND MACHINERY CORP.*, Harrison, N.J. He has been assistant manager of the Cincinnati office since 1945. *WILBUR R. LEOPOLD* is now assistant to Vice President *T. CRUTHERS* and will function on public works projects. He is succeeded as manager of the Detroit office by *CLARENCE S. WENTWORTH*, a member of the Chicago sales force.

New executive officers for *D. J. MURRAY MFG. CO.*, Wausau, Wis., include *A. W. PLIER*, executive vice president and general manager; *D. J. EVEREST*, vice president; *C. L. DURKEE*, director, vice president, and sales manager. .... *WAYNE BELDEN* has been elected executive vice president of *AJAX FLEXIBLE COUPLING CO., INC.*, Westfield, N.Y. *CHARLES BELDEN* has been made vice president and *ROBERT G. CADY* is now sales manager.

Formerly executive vice president in charge of production, *A. C. PERKS* is now president and general manager of *ECLIPSE FUEL ENGINEERING CO.*, Rockford, Ill. *H. P. HOWELL*, formerly president, is now chairman of the board. .... *WALTER H. WITHAM* is now per-

You Sell BOTH Markets

9 out of 10 New Homes Heat with OIL or GAS

Available Oil-Fired

Availab Gas-Fired

Burners Interchangeable

with ALDRICH
HEAT-PAK BOILER-BURNERS

Expand your market to 90% of new home construction with Aldrich. Sell more, with less inventory . cash in with oil units, cash in again with gas burners.

Mounting plates are similar; installation is fast and simple. And you can convert from one fuel to another without changing boiler set-up or performance.

7 makes 14

Aldrich Heat-Pak boilers come in 7 sizes, from 100,000 to 808,000 BTU/hr. With both oil and gas, you have 14 compact heating plants to sell everything from modern small homes to big commercial installations. Vertical-type, compact and efficient; shipped crated fully assembled, ready to set in place and connect.

Profit with ALDRICH—Get Details Today. Write or wire for Heat-Pak facts, full specifications.

ALDRICH HEAT-PAK PRODUCTS

The ALDRICH Company
105 East Williams Street, Wyoming, Ill.
A Subsidiary of Breeze Corporations, Inc.

ANOTHER BREEZE MARK PRODUCT

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weil "TVC" CONDENSATE
FOR LOW PRESSURE SYSTEMS

(WRITE FOR BULLETIN TVC-300)

LOW RETURN CONNECTION

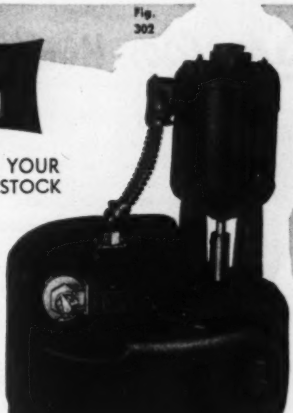
CAST IRON RECEIVER

WATERLINE EXTREMELY LOW

Provides Freedom of Layout
Permits Overhead Lines
Capacities—500 to 10,000 sq. ft. E.D.R.

NOW IN YOUR JOBBER'S STOCK

Fig. 302



Also ask about

NRG

Series

for underground installations — takes the low returns and pumps them back to boiler. Only limited space required.

OTHER TYPES

TYPE R
Hot and chilled water circulating
Ball bearing—once a year lubrication
Capacity—10 to 750 GPM
(write for Bulletin R5500)

TR HORIZONTAL
Low and high pressure systems
Ball bearing—heavy duty
Capacities to 100,000 sq. ft. E.D.R.
Pressures to 125 P.S.I.

weil PUMP COMPANY

1523 NORTH FREMONT ST.
CHICAGO 22, ILLINOIS

sonnel manager of *BAKER REFRIGERATION CORP.*, South Windham, Me. A graduate and former faculty member of the University of Maine, he recently received a master's degree at Cornell University.

D. D. COUCH, vice president and general manager of sales, American Radiator & Standard Sanitary Corp.., has been elected to the board of directors of the *PRODUCERS' COUNCIL* for 1951 and 1952. The council, with its 30 chapters, is a national organization representing manufacturers of building products. .... The new manager of valve distributor sales for *MANNING, MAXWELL & MOORE, INC.*, Bridgeport, Conn., is *R. F. ATTNER*. Since 1945 he has been assistant to the sales manager for Hancock valves at Watertown, Mass.

COCHRANE CORP., Philadelphia, has named *ERVIN J. BOOKOUT* general sales manager. For many years he was a sales engineer in the Philadelphia territory and more recently was eastern sales manager. .... *CLIFFORD OFF, JR.*, sales manager, and *HARRY E. RAPP*, technical director, are now members of the board of directors of *INSUL-MASTIC CORP. OF AMERICA*, Pittsburgh.

ZIMMERMANN & LUKS, consulting engineers, have opened a new office at 500 Fifth Ave., New York City. .... *GEORGE W. INGHAM* is now assistant works manager at the Minneapolis plant of *UNITED STATES AIR CONDITIONING CORP.* He was formerly general superintendent in charge of air conditioning at the Holyoke, Mass., plant of Worthington Pump and Machinery Corp. United States Air Conditioning has also named *JOSE SALVAT & CO., LTDA.*, Barranquilla, Colombia, exclusive representative and distributor.

CHARLES R. HOLZWORTH, who has been vice president and general manager of the Tonawanda Iron Division, *AMERICAN RADIATOR & STANDARD SANITARY CORP.*, Pittsburgh, is now president of the division. He succeeds *B. S. STEPHENSON* who has retired. *S. K. AUGUSTINE* and *H. WATSON PADDOCK* are newly appointed assistant comptrollers of American-Standard. .... *GORDON STEINHOFF*, who has had wide experience in sales engineering, is now managing the aircraft division of *GENERAL CONTROLS CO.*, Glendale, Calif.

WORTHINGTON-GAMON METER CO., Newark, N.J., a subsidiary of *WORTHINGTON PUMP AND MACHINERY CORP.*, has elected new officers. *CHARLES E. WILSON* formerly president, is now chairman of the board. *ROBERT R. ANDERSON* is the new president and *WILLIAM C. FLANDERS* is vice president in charge of sales. · *WALTER H. ZEIS* is secretary-treasurer.

INGERSOLL STEEL DIV., BORG-WARNER CORP., Chicago, has named *RICHARD BROWN* director of personnel at Kalamazoo, Mich. For the past 12 years he has been engaged in the field of industrial relations. *DEE WILLIAMS* is employment supervisor and will continue to handle the employment and training of new employees.

Sterlco **Heating and Temperature Control Products**

Heating Specialties

¾" 69-B Float and Thermostatic Trap.

Thermostatic Traps: ½" to 1" sizes; low, medium, high pressure; wide variety of body styles.

Float and Thermostatic Traps: ¾" to 2" sizes; low and high pressure.

Strainers: ⅜" to 2" sizes; cast iron or brass bodies. Also *Radiator Valves, Vents, Boiler Return Traps.*

Temperature Control Valves

120-A Thermotrol Individual Radiator Temperature Control.

No. 120 Thermotrol: Self-contained individual radiator temperature control for steam or hot water. Easily installed in place of manual radiator valve. Sizes ½" to 1"; all body styles.

Tank Temperature Controls: Self-powered modulating control valves for fluid heaters and all types of process equipment for heating or cooling. Sizes ⅜" to 2".

Condensation and Vacuum Pumps

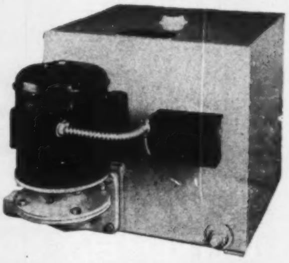
4100 Series: Compact, economical condensation pumps with 15 or 30 gallon steel tank, dual voltage capacitor type motor, rotary seal, and simple, sturdy vertical centrifugal pump. For all low pressure jobs up to 14,000 sq. ft. E.D.R. and 20 lbs. pressure.

4200 Series: Same as 4100 Series except cast iron tanks.

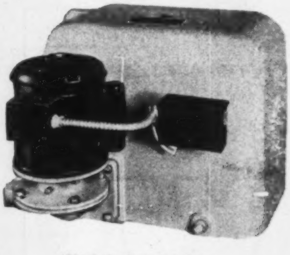
3500 Series: Heavy duty condensation pumps with pedestal mounted steel tank, for a wide range of jobs — 2000 to 65,000 sq. ft., up to 150 lbs. pressure.

3700 Series: Condensation pumps with heavy cast iron tank for installation underground or in wet locations. 2,000 to 20,000 sq. ft., 20 or 30 lbs. pressure.

Vacuum Pumps: Type V, 2500 and 5000 sq. ft., 20 lbs. pressure. Type S, 10,000 to 40,000 sq. ft., 20 to 40 lbs. pressure.



4126-B Condensation Pump (Steel Tank)



4226-B Condensation Pump (Cast Iron Tank)

Descriptive bulletins with complete specifications of any of the above products will be furnished promptly upon request.

Distributed through Leading Heating and Plumbing Wholesalers
Sales Representatives in Principal Cities

STERLING, INC. 3732 N. Holton Street
Milwaukee 12, Wisconsin

New "Controlled Humidity" Method Gives a Better Solution to Air Conditioning Problems

"Hygrol"

Absorbent

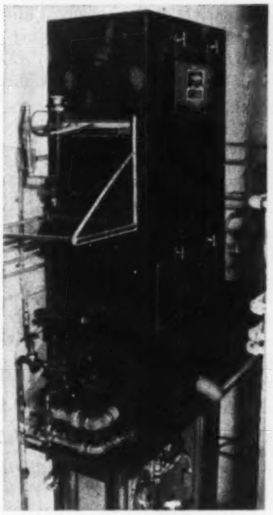
Liquid

Dehumidifies

Fresh Air

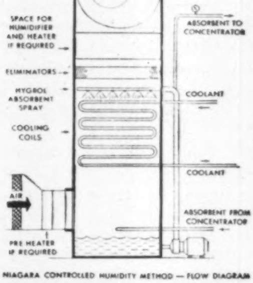
Without

Refrigeration



● NIAGARA Air Conditioners or Dehumidifiers using "Hygrol" liquid absorbent give precise control of air temperature and humidity . . . at lower operating cost, with large savings in space and with smaller and less expensive equipment, in many applications.

This method dehumidifies the air by passing it through a chamber in which "Hygrol" spray removes its moisture and produces a low dew point. The "Hygrol" solution resulting is continuously and automatically re-concentrated, providing always full capacity in air conditioning and assuring always a constant dehumidifying capacity and a trustworthy, constant condition for your material, apparatus, process or room to be conditioned.


AIR
SPACE FOR HUMIDIFIER AND HEATER IF REQUIRED
ELIMINATORS
HYGROL ABSORBENT SPRAY
COOLING COILS
AIR
PRE HEATER IF REQUIRED
ABSORBENT TO CONCENTRATOR
COOLANT
COOLANT
ABSORBENT FROM CONCENTRATOR

NIAGARA CONTROLLED HUMIDITY METHOD — FLOW DIAGRAM

"Hygrol" is a liquid, not a salt solution; it stays pure and non-corrosive; does not cause maintenance or operating troubles in food plants or in chemical processes.

Investigate this new Method for "comfort" air conditioning as well as to protect quality in hygroscopic material, or processes or instruments, or to prevent condensation damage to metals, parts or products.

Write for Bulletin No. 112

NIAGARA BLOWER COMPANY

Over 35 Years of Service in Industrial Air Engineering

Dept. HP, 405 Lexington Ave. New York 17, N. Y.

Experienced District Engineers in Principal Cities

IN STOCK for Your Convenience

AURORA CLOSE-COUPLED *Package* AIR CONDITIONING PUMPS

They have **EVERYTHING!**

- ☑ LOW COST
- ☑ SMOOTH, QUIET
- ☑ DEPENDABLE
- ☑ LONG LIVED
- ☑ MECHANICAL SEAL
- ☑ DISASSEMBLY is QUICK and SIMPLE*

for EVAPORATOR COOLING TOWERS

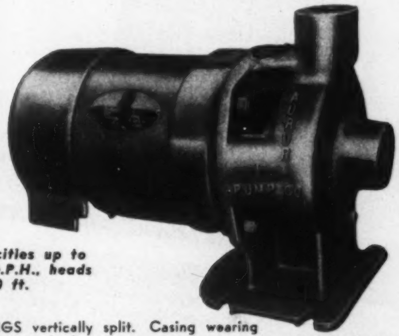
•

AIR CONDITIONING UNITS

•

***also for* GENERAL SERVICE**

Air conditioning contractors as well as manufacturers of air conditioning equipment will welcome these notable close-coupled package pumps. Mechanical seal requires no packing or maintenance. *Pump may be disassembled without disturbing discharge connections or hold down bolts. Sturdy, lasting and efficient.



Capacities up to 150 G.P.H., heads to 100 ft.

Aurora Type JMC Pump — Close-Coupled

CASINGS vertically split. Casing wearing ring standard.

MECHANICAL SEAL is standard on all sizes and located in packing cover.

IMPELLER is balanced, of enclosed type, high grade bronze.

MOTOR — NEMA specifications, Stainless Steel Shaft on JMC — for all circuits and various enclosures.

BALL BEARINGS — on JMC built into motor.

OTHER AURORA AIR CONDITIONING UNITS

We are also in a position to supply various sizes of air conditioning pumps in V-Belt drive, and flexible coupling drive. Our large type G.M.C. Close-Coupled Pumps can be furnished up to 800 G.P.M. and heads to 200 ft.

Complete Information on Request

DISTRIBUTORS IN PRINCIPAL CITIES

AURORA *Always* PUMPS

AURORA PUMP COMPANY

80 Loucks St., Aurora, Illinois

hot water in a hurry!

Where sudden hot water pulls—or an unpredictable time schedule—are in the order of things, install

Paracoil INSTANTANEOUS WATER HEATERS

TO KEEP PACE WITH THE LOAD—ALL THE WAY!

No storage tank is necessary—they have enough, and more, heating surface built into them to heat the water as fast as it is drawn! Thousands in use.

If you have such a problem, we have the answer! Stock designs permit quick deliveries...at prices lower than you think!

Write today for a copy of our new Bulletin 70 Section I, describing this line of Paracoil Water Heaters.

This bulletin, in addition to tables of capacities and physical dimensions on our U-Tube designs, contains a wealth of practical, worthwhile engineering data on how to size, figure steam requirements, and pipe up PARACOIL INSTANTANEOUS WATER HEATERS. YOUR COPY AWAITS YOU!

DAVIS ENGINEERING CORPORATION

1064 East Grand Street
ELIZABETH 4, NEW JERSEY

30 Rockefeller Plaza
NEW YORK 20, NEW YORK

AGENTS IN PRINCIPAL CITIES

FRANK SUTTON, who has operated his own consulting engineering firm in New York for many years, has joined the staff of *GUY B. PANERO*, engineers of New York and Washington. Mr. Sutton has been responsible for the mechanical engineering design of many well known institutional and commercial buildings. .... With headquarters at the Tacony, Philadelphia, plant, *WILBUR E. COMBS* is the new product manager for the *L. H. GILMER DIV., UNITED STATES RUBBER CO.*, New York. He is responsible for the sale of products manufactured by the division.

Newly elected officers of the *REFRIGERATION SERVICE ENGINEERS SOCIETY* are: president — *CECIL R. VISGER*, Kansas City, Mo.; first vice president — *CARL W. NEISEL*, Corpus Christie, Tex.; second vice president — *J. D. NALL*, Miami, Fla.; treasurer — *M. R. HANKS*, San Diego, Calif; and international secretary — *H. T. McDERMOTT*, Chicago.

ALLIS-CHALMERS MFG. CO., Milwaukee, has opened a branch office at 269 Water St., Augusta, Me. *D. P. APPLETON*, formerly a sales representative in the Boston office, is in charge. *GEORGE A. WAMPLER*, former sales representative in the Memphis district office, is now managing the Chicago warehouse sales unit, a new section set up in the company's Chicago office to handle the sale of small apparatus including motors, controls, v belt drives, and pumps.

LADISH CO., Cudahy, Wis., has opened a branch office at 405-406 Thompson Bldg., Tulsa, Okla., under the management of *G. E. MAHONEY*, who has been district manager in Chicago for the past three years. *W. H. HECKENBERG* is now in charge of the St. Louis office which has been moved to the Continental Bldg., 3615 Olive St.

The new general sales manager for *MOTORSTOKOR DIV., HERSHEY MACHINE & FOUNDRY CO.*, Manheim, Pa., is *JOHN D. WENTZ*. He formerly held sales and advertising positions with N. W. Ayer & Son, Inc., Willson Products, Inc., and Tanis Co.

UNION MALLEABLE MFG. CO., Ashland, Ohio, has named three new sales representatives. *ALBERT T. SINGER*, 1203 Park Ave., Rochester, N. Y., is covering the Buffalo-Rochester territory. The northern Ohio territory is being handled by *LEONARD J. GROSSMAN*, 3614 Euclid Ave., Cleveland 15, and representation in the southern Ohio territory is being handled by *LOFTUS SCHOENBERGER*, Temple Bar Bldg., Cincinnati 2.

D. J. MURRAY MFG. CO., Wausau, Wis., has named *AMERICAN EQUIPMENT CO.*, P. O. Box 7103, New Orleans 19, representative for its unit heaters in the states of Louisiana and Mississippi. Representation in Texas is now being handled by *ACME ENGINEERS*, 8219 Joplin St., Houston 17. . . . *INSUL-MASTIC CORP. OF AMERICA*, Pittsburgh, has added three licensees to its national organization. These are: *INSULATION ENGINEERS, INC.*, Conception St. Rd., P. O. Box 815, Mobile, Ala.; *INDUSTRIAL ROOFING & SHEET METAL CO.*, 4851 Lexington Ave., Cleveland; and *R. F. ZIMMERMAN & CO.*, 1121 Spring St., P. O. Box 1721, Shreveport, La.

It is not what we say—
but what they do
that counts

The best advertising of
MERCOID CONTROLS
is in their performance

MERCOID
SWITCH

MERCOID SWITCH
VISAFLAME
MERCOID SWITCH 9-81

MERCOID CONTROLS ARE EQUIPPED WITH MERCURY SWITCHES, THEREBY INSURING GREATER SAFETY, BETTER PERFORMANCE AND LONGER CONTROL LIFE

MANUFACTURERS OF AUTOMATIC CONTROLS FOR HEATING, AIR CONDITIONING, REFRIGERATION AND NUMEROUS INDUSTRIAL APPLICATIONS. ALSO MERCOID BRAND MERCURY SWITCHES.

☆ WRITE FOR CATALOG 600-B. PLEASE MENTION THIS PUBLICATION ☆

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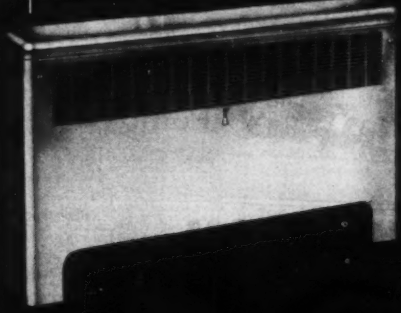

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Write for your copy of this new folder which explains in detail the coupling features which provide added insurance against coupling failure. Useful information for every coupling user. Copy will be sent promptly on request.

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NEW BOOKS & REPORTS

Offer Standardized Design Procedure for Air Conditioning

In their 84 page pamphlet, Complete Air Conditioning Analysis, A. Donald Hay, assistant professor of mechanical engineering, Princeton University, and Carlton P. Roberts, chief engineer, Voorhees, Walker, Foley & Smith, architects and engineers, offer a standardization of design procedure for air conditioning which has been established in order to insure the full investigation of each air conditioning problem in a systematic manner so that problems can be quickly analyzed and computed and the conclusions established and checked. It is recommended by the authors for all but the smallest of installations.

All data and calculations are recorded on basic form sheets which are numbered in the order in which they will normally be used. Basic information and known factors such as floor areas, design temperature conditions, hours of operation, permissible noise levels, etc. are recorded on Form 2 (Form 1 being reserved for a description of the space under consideration). Form 3 is used for recording other design data such as structural details, lighting loads, heat produced by motors and other equipment, etc. Other form sheets are used for recording the quality and state of air, the cooling and heating loads, the selection of the control system, cost analysis and design summary. Form 6 is used for a change of state investigation. This is provided to make certain that the completed design has the capacity and flexibility to retain the state of air inside the conditioned spaces within design limits when the outside air attains various probable states other than the selected maximum design conditions. Explanatory material for the use of each form sheet is included.

The manuscript was written in the summer of 1948 and tested for 1½ years in the design offices of Voorhees, Walker, Foley & Smith. It was then revised from experience gained through use and is now available for $1.50 from Mr. Hay. Form sheets are available at 1 cent per sheet, and there are 30 sheets in each set of forms which need not be purchased in sets, as some forms are used faster than others.

Investigates Pressure Drop In Heat Transfer for Subsonic Air Flow

The high velocity subsonic flow of air in a straight circular tube has been investigated theoretically and experimentally under boundary conditions of constant heat transfer. A paper, Pressure Drop and Heat Transfer for Subsonic Air Flow in a Smooth Pipe, by W. Goldsmith, assistant professor in engineering design, and R. A. Seban, lecturer in mechanical engineering, University of California, provides an analysis pertaining to this type of system and compares predicted and experimental values.

Local values of friction factors in heat transfer coefficients calculated from the data show a decreasing trend with increasing velocity, although the mean values of these terms correlate satisfactorily with accepted empirical relations defining the best fit of the experimental results of previous investigators.

Identified as Paper No. 50-F-18, the paper was presented at the fall meeting of the American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

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All copper spiral fin tube construction with the tubes formed or bent permits uniform expansion without strain. Headers are heavy wall construction with tubes brazed into extended ferrules formed in the headers. Fins are helically wound and metallically bonded. May we send catalog?

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A proven heating unit, modern in design, incorporating every unit heater advancement. McCord copper spiral fin tube construction creates air turbulence without undue restriction. Improved fan blades deliver large volume of air with minimum air noise. Guaranteed for 150 lbs. saturated steam pressure. Specify McCord.

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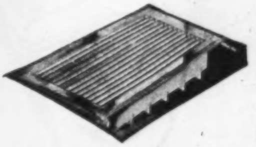

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ultra-strong oak finish, baked on for longer wear —matches flooring.

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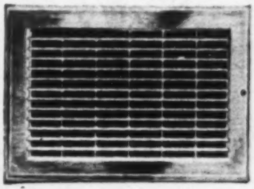

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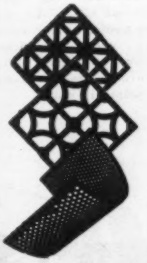

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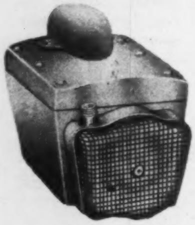

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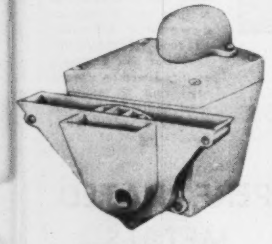

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THE LITTLE GIANT VAPORIZER is a complete, compact unit that breaks and projects water in a fine, vapor-like spray. It is the most efficient unit to be found for use in evaporative coolers, for humidity control, and for cooling condenser coils.

The motors of both units are hermetically sealed in a five year's supply of oil, therefore, the motor windings cannot become wet and cause the motor to burn out. The motor housings are of die-cast aluminum and treated against corrosion in any water. Stainless steel screws are used throughout. The units are vibrationless and noiseless in action.

Little Giant Vaporizer Co., Inc.
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Describes the Design of a 20 Ton Absorption Air Conditioner

In a paper, Absorption Air Conditioner, E. P. Whitlow and L. A. McNeely, development engineers, Servel, Inc., describe the steps in designing a 20 ton system — from general requirements to the full scale model.

Leading off with a description of the basic cycle of the absorption refrigeration system, the authors explain why the water-lithium bromide system was chosen, why a secondary system is used, and they describe the heat transfer surfaces required. After covering design considerations of this steam operated unit, the authors discuss the construction of the unit itself and its performance.

The nominal capacity is 20 tons, this being the actual capacity when the unit is supplying chilled water at 45 F with condensing water entering at 85 F and leaving at 105 F. Under these conditions the steam consumption is said to be 18.1 lb per ton-hr. The performance factor at this point is slightly over 0.68. With cooler condensing water available, the capacity is said to increase markedly.

This paper was presented at the recent annual meeting of the American Society of Refrigerating Engineers, 40 W. 40th St., New York 18.

Apprenticeship Programs Require Sound Vocational Training

Impending manpower demands, according to the Chamber of Commerce of the United States, make imperative assurance of a continuing skilled worker supply for the construction industry. This is emphasized by the Chamber in a pamphlet, Related Instruction—A Key to Apprentice Training in Construction, prepared by its construction and civic development department subcommittee on apprenticeship and training.

According to the 20 page paper covered booklet, sound apprenticeship programs should provide for adequate and thorough training of young men in the crafts of their choice. The responsibilities of interested groups in education, industry, labor and government are discussed. A chart indicates the scope of the effort of each of the interested groups. Particularly emphasized is the role of vocational education in the related technical and supplemental instruction of apprentices.

The booklet is available for 10 cents from the Construction and Civic Development Dept., Chamber of Commerce of the United States, Washington 6, D. C.

Text on Principles of Microclimatology Revised

The second edition of The Climate Near the Ground, by Dr. Rudolf Geiger, professor of meteorology and director of the meteorological institute at the University of Munich, deals in detail with the climate of the lowest two meters or so of the atmosphere and shows how the earth's surface, acting as the principle receiver and emitter of radiation, causes the climate near it to contrast sharply with the large-scale climate and to obey quite different laws.

The first part is divided into four sections and 17 chapters, and is concerned with the microclimate existing by virtue of its proximity to the earth's surface. It contains a discussion of the manifold ways and means by which heat moves to and from the ground. The consequences of this heat transfer are then investigated with respect to the temperature relationships which, in the lowest layer of air,

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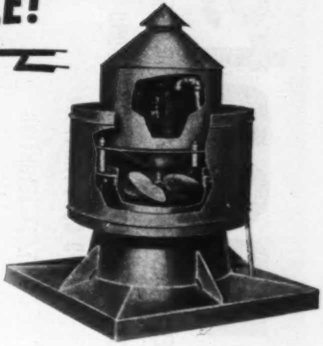

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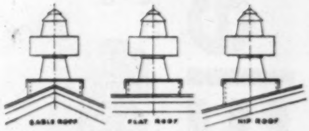

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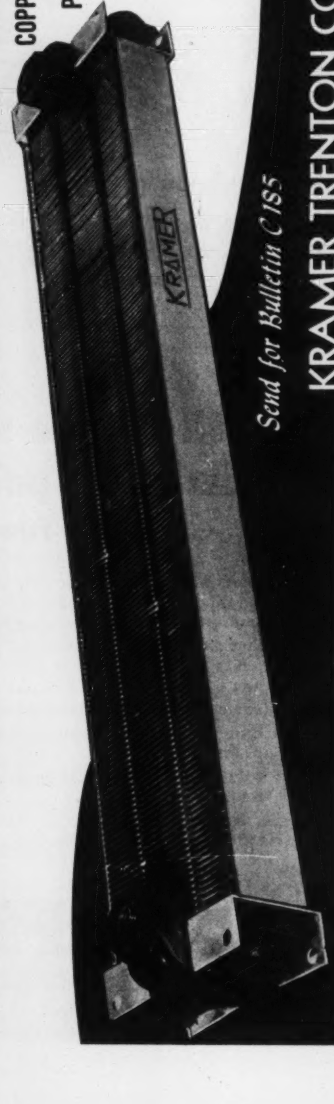

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are completely different from those in the region of the upper air. Next to be examined are other weather factors, such as vapor pressure, relative humidity, wind velocity, dust content, visibility, etc. Part I closes with a treatment of the influence of the earth itself on the climate near it. The remaining three sections of 24 chapters, forming the second part of the book, contain an analysis of the influence that topography and plant cover have on the nature of the microclimate, and explore the important interconnections between the microclimate and animate creatures, from insects to man.

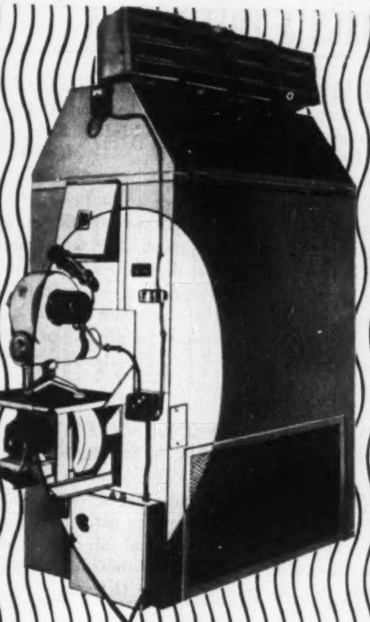
The book was first published in 1927. The present edition is a thorough revision which has been enlarged to present the results of many advances made in this field during the past 20 years. It has been translated by Milroy N. Stewart and others and is available from Harvard University Press, 44 Francis Ave., Cambridge 38, Mass., for $7.50. It contains 115 illustrations, 101 tables, and over 460 pages.

Other Books & Reports Received

INDUSTRIAL AND SAFETY PROBLEMS OF NUCLEAR TECHNOLOGY, edited by Morris H. Shamos, assistant professor of physics, Washington Square College, New York University, and Sidney G. Roth, assistant professor of mathematics in the college of engineering and director of technical studies in the division of general education, New York University — The special technical problems and dangers peculiar to the development of atomic power are discussed by 21 leaders in the fields of industrial development, nuclear research, medicine and casualty insurance. The book is an outgrowth of a three-day conference sponsored by the Atomic Energy Commission and New York University. It is divided into four parts dealing with the United States Atomic Energy Commission activities, radio chemistry and isotropes, the radio chemical laboratory, hazards, safety and insurance. Containing 368 pages and priced at $4.00, it is published by Harper & Bros., 49 E. 33rd St., New York 16.

ANNUAL REPORT OF THE NATIONAL BUREAU OF STANDARDS FOR 1949—A summary of scientific investigations carried on at the bureau during the fiscal year 1949 is contained in a 101-page illustrated booklet (NBS Miscellaneous Publication 198) available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. for 75c. Among the many activities covered are building technology, corrosion, low temperature physics, heat and power, mechanics, organic and fibrous materials, mineral products, and commodity standards.

RESEARCH IS LEARNING—A comprehensive definition of the role of research in engineering education, compiled by representatives of 83 leading engineering schools, is the central theme of this new nontechnical publication of the Engineering College Research Council of the American Society for Engineering Education. Also included in the 32-page publication are 12 summaries of research activities now under way at a number of universities, including research in connection with fluid mechanics, gas absorption, and spray measurement. Copies are available without cost from the council's secretary, Room 7-204, 77 Massachusetts Ave., Cambridge 39, Mass.



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. . . . The Olson heater has a rigid base, free from vibration, low fan speed, oversize drive, heavy shaft, large self-aligning ball bearings, heavy outside casing with radiation shield and ample relief and access doors.

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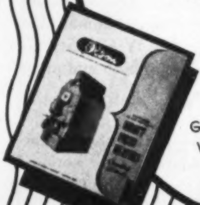

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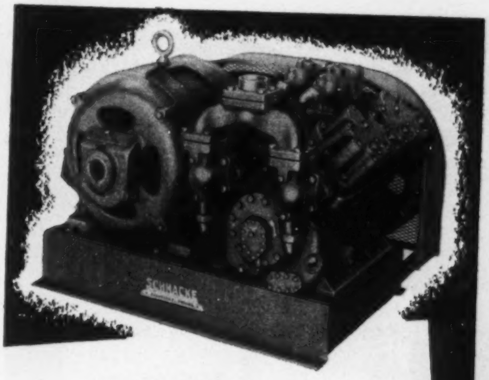

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Schnacke Refrigeration Equipment fits into your setup hand-in-glove. Schnacke does not dictate your policies . . . set quotas . . . insist in compulsory stock, franchise, or contract in the field. Schnacke is chosen on merit and price alone and sells direct to contractors.

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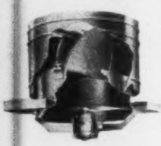
■ In roof ventilation, you need air movement—and plenty of it! The new Propellair Sky-Blast gives you powerful air movement at minimum cost. With capacities from 2800 to 78,800 CFM, its performance is amazing! Here are a few of its advantages:



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Sky-Blast design is strictly functional—no frills, no gadgets. A powerful suction sweeps up heat, moisture, dust fumes . . . and a strong exhaust shoots them high into the outside air. Performance is constant, regardless of wind direction or velocity!

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You get many engineering refinements in the new Sky-Blast . . . including automatic butterfly dampers that will not leak, streamlined wind guard, and non-clogging rainshed. The heart of the Sky-Blast is the famous cast-aluminum airfoil propeller—powered by a fully enclosed, weather-resistant R & M motor.

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MEETINGS & CONVENTIONS

PLANT MAINTENANCE SHOW AND CONFERENCE, to be held January 15 to 18 in the Cleveland Auditorium. Advance registration cards and hotel information may be obtained from Clapp & Poliak, Inc., 341 Madison Ave., New York 17, show manager.

A plant maintenance conference, to be held during the first three days of the show, will include discussions of power plant and heating equipment, lubrication, and electrical equipment. Exhibits at the show will include heating, ventilating, and air conditioning equipment. Some 45 speakers will address the conference which, together with the show, is being sponsored jointly by the American Society of Mechanical Engineers and the Society for the Advancement of Management.

LOUISIANA ENGINEERING SOCIETY—The 1951 annual meeting will be held at the St. Charles hotel, New Orleans, January 18 to 20. The program will include technical sessions, exhibits, and plant tours. Local chapters and student branches of various national engineering societies will participate. Additional information may be obtained from George E. May, of the society's publicity committee, 317 Baronne St., New Orleans.

2nd INDUSTRY-COLLEGE CONFERENCE—To be held at Case Institute of Technology, Cleveland, January 20. The Engineer and National Security will be the theme of the affair which is sponsored by the relations with industry committee of the American Society for Engineering Education and Case Institute. Speakers will include Dean Francis M. Dawson, college of engineering, State University of Iowa; G. M. Read, chief engineer, E. I. du Pont de Nemours & Co.; and Major General Lewis B. Hershey, director of selective service. Three simultaneous panel sessions will be held in the afternoon.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, 51 Madison Ave., New York 10—The 1951 annual meeting will be held in Philadelphia, January 22 to 25. Registration and technical sessions will be at the Bellevue-Stratford hotel, other meeting functions at the Benjamin Franklin and Warwick hotels. For additional information, see the special Show Section in this issue.

10*th INTERNATIONAL HEATING, VENTILATING AND AIR CONDITIONING EXPOSITION*—Under the auspices of the American Society of Heating and Ventilating Engineers, the show will be held January 22 to 26, Commercial Museum, Philadelphia. International Exposition Co., 480 Lexington Ave., New York City, is managing the affair. For a listing of exhibitors and other details, see the special Show Section in this issue.

STANDARDIZATION SEMINAR—To assist manufacturing organizations in their standardization work, a private five-day seminar will be held by Dr. John Gaillard, mechanical engineer, American Standards Association, and lecturer at Columbia University. The dates are January 22 through 26 and the place is room 501-A, Engineer-

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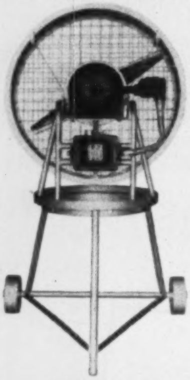

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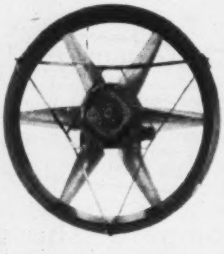
For general or specific ventilation, man-cooling, or parts-cooling—to increase personnel efficiency and decrease lost time in cooling and drying hot parts. Portable. Direction of blast adjustable. Explosion-proof motor, metal conduit and starter can be supplied. Conforms to state safety regulations.



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ing Societies Bldg., New York City. Ten conferences are scheduled and additional information may be obtained from Dr. Gaillard at 400 W. 118 St., New York 27.

REFRIGERATION AND AIR CONDITIONING EDUCATIONAL CONFERENCE, January 26 to 28, Dallas, Tex.—Sponsored by the Refrigeration Equipment Manufacturers Association, 1346 Connecticut Ave., N.W., Washington 6, D.C.

HEATING SHORT COURSES—Two "engineering institutes", on the pattern of short courses, will be held at the University of Wisconsin. Sessions on steam and hot water heating will be held February 13 to 15 and classes scheduled for March 13 to 15 will cover warm air heating and air conditioning. Enrollments are limited and additional information may be obtained from Prof. H. E. Pulver, University Extension Division, Madison, Wis.

AMERICAN SOCIETY FOR TESTING MATERIALS, 1916 Race St., Philadelphia 3—National meetings scheduled for this year are the spring meeting and committee week, March 5 to 9, Cincinnati, and the annual meeting, June 18 to 22, Atlantic City. The 1952 spring meeting and committee week will be held, March 3 to 7, in Cleveland and the 1952 annual meeting is scheduled for June 23 to 27 in New York City.

INTERNATIONAL INDUSTRIAL EXPOSITION—March 11 through 17, the Coliseum, Houston, Tex. According to the exposition management, located at 41 San Jacinto St., Houston 2, exhibits will cover oil, refining, chemicals, metals, machinery, power, material handling, welding, instruments, etc.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS, 919 Milam Bldg., Houston, Tex.—The 1951 conference and exhibition will be held at the Hotel Statler, New York City, March 13 to 16, and plans are now underway for the presentation of 39 technical papers.

AMERICAN FOUNDRYMEN'S SOCIETY, 616 S. Michigan Ave., Chicago 5—The 55th annual convention will be held in Buffalo, N. Y., April 23 to 26.

MATERIALS HANDLING EXPOSITION—International Amphitheater, Chicago, April 30 to May 4. Industries which will be given special attention in exhibits include paint and varnish, oil, chemicals, and food processing. Simultaneously with the show, which is sponsored by the Material Handling Institute, a three-day conference will be conducted by the American Material Handling Society. Advance registration cards and hotel information may be obtained from the show manager, Clapp and Poliak, Inc., 341 Madison Ave., New York 17.

AIR POLLUTION AND SMOKE PREVENTION ASSOCIATION OF AMERICA—The 1951 annual meeting will be held May 6 to 10, Roanoke, Va.

HEATING, PIPING & AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION, 1250 Avenue

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A HABIT WITH

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"1407 BROADWAY" – 42 stories – the latest word in industrial architectural design and again FAIRBANKS Valves are on the job. The plumbing, heating, sprinkler and air conditioning systems – all FAIRBANKS Valves.

Why this preference? What is the answer? Look at the facts:

1. **A complete line of bronze and iron body valves.**
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5. **A spirit of team work, cooperation and pride in a job well done that is symbolical of THE FAIRBANKS COMPANY.**

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Dutton Steam Generators are QUALITY PRODUCTS, incorporating exclusive features of LONG LIFE, LOW OPERATING AND MAINTENANCE COST, MAXIMUM EFFICIENCY and SAFETY that only 71 years experience in boiler making can produce. Dutton Automatic "Packaged" Steam Generators are completely assembled – no special foundation or expensive chimney are needed.

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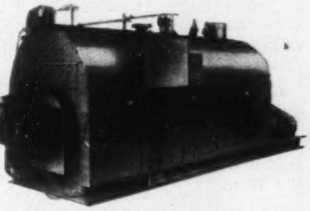

A completely self-contained, fully automatic, three pass modified Scotch Internal Furnace type which gives twice the power in half the usual space. Features such as the Dutton Off-Center Firing and Rotary Combustion assure faster steam and more steam with less fuel consumption and greater safety. Burns gas or oil.

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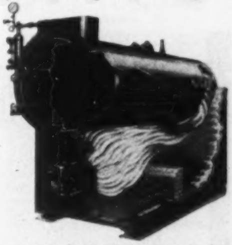

A highly efficient horizontal return tube type, assembled in portable casing and ready for firing on arrival. Dutton improved shell design and double size full length, high bricked firebox, give faster steaming and longer steam carry-over with less fuel consumption. Burns oil, gas or coal with high efficiency – easily converted from one fuel to another. Can be provided as a package unit with firing equipment, controls and low mechanical draft stack.

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Dutton BOILER DIVISION
HAPMAN-DUTTON COMPANY
KALAMAZOO • MICHIGAN
Boiler Makers Since 1880

of the Americas, New York 20—The 62nd annual convention, Washington, D. C., May 8 to 11.

AMERICAN INSTITUTE OF ARCHITECTS, Washington 6, D. C.—The 1951 convention and national seminar meetings will be held May 8 to 11, Edgewater Beach hotel, Chicago. For the first time in 83 years a product exhibition will be held in conjunction with the affair. According to the institute, only those building products or methods recently placed in production or shortly to be offered commercially will be granted space.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS, 40 W. 40th St., New York 18—The 38th spring meeting will be held at the Hotel Statler, Detroit, May 27 to 30.

NATIONAL DISTRICT HEATING ASSOCIATION, 827 N. Euclid Ave., Pittsburgh 6—The 42nd annual meeting will be held June 5 to 8 at the Statler hotel, Detroit.

EIGHTH INTERNATIONAL CONGRESS OF REFRIGERATION—To be held in London, England, August 29 to September 11. Maurice Piettre, 9 Avenue Carnot, Paris, France, is secretary of the International Institute of Refrigeration, which is planning the affair.

6th NATIONAL INSTRUMENT CONFERENCE AND EXHIBIT—Sponsored by the Instrument Society of America, 921 Ridge Ave., Pittsburgh 12. The affair will be held in the Sam Houston Coliseum, Houston, Tex., September 10 to 14.

INTERNATIONAL DISCUSSION OF HEAT TRANSFER—Postwar heat transfer developments will be the theme of a meeting, September 11 to 13, London, England. Plans for participation by engineers in the western hemisphere are being arranged by a joint committee on North American participation, which consists of representatives from some 12 professional and engineering societies. The American Society of Mechanical Engineers is coordinating administrative details. Participation by British and European engineers is being coordinated by the Institution of Mechanical Engineers.

BRITISH BUILDING RESEARCH CONGRESS—Sponsored by a number of professional institutions and societies, government departments, and representative industrial federations, the congress will be held in London, September 11 to 20. Additional information may be obtained from the organizing secretary, Building Research Congress 1951, Building Research Station, Bucknalls Lane, Garston, Watford, Herts, England.

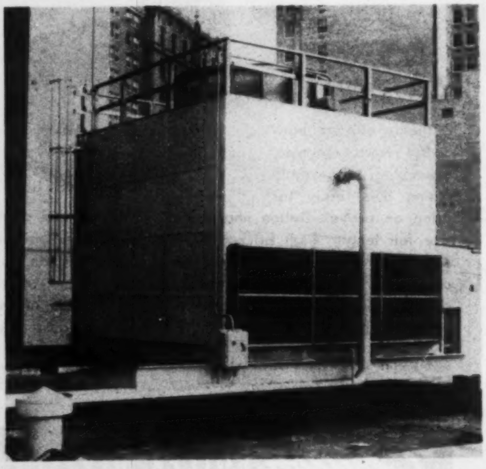
Among the papers to be presented during the heating and ventilating sessions is one on heat transfer, by Prof. C. O. Mackey, Cornell University, and one on radiant heating by Prof. F. W. Hutchinson, University of California.

THE 7th ALL-INDUSTRY REFRIGERATION AND AIR CONDITIONING EXPOSITION, to be held at Navy Pier, Chicago, November 5 to 8. The affair is sponsored by the Refrigeration Equipment Manufacturers Association, 1346 Connecticut Ave., Washington 6, D.C.

UNITED Builds A COMPLETE LINE OF

COOLING TOWERS

for Refrigeration and Air Conditioning



450 ton United Tower in commercial air conditioning service. Transite sheathed; deck filled; low pressure sprinkler distribution.

Individually designed and constructed mechanical draft equipment in any required capacity.

Standardized, prefabricated, easily assembled "package" type spray towers for 5 to 30 tons refrigeration.

Bulletin No. 50 shows typical United installations in all fields . . . power, oil, gas and refrigeration . . . gives full details of design and construction features. Write for it today.

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Porter Bldg. *Authorized Representatives in Principal Cities* *Kansas City 2, Missouri*

Announcing

ASCO "MIDGET" SIZE TWO-WAY AND THREE-WAY SOLENOID VALVES

Only
2$\frac{13}{16}$"
From
Finger
to
Thumb
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This is the new small ASCO Two-Way Solenoid Valve . . . only 2-13/16" from the top of the solenoid housing to the bottom of the valve body. The Three-Way Valve or the Two-Way Valve designed for Normal Open Operation is only slightly larger, being only 3-5/16" from top to bottom. (The latter valve is the lower picture.)

These Midget Two-Way and Three-Way Valves have many applications in the control field because of their compactness, sturdiness and efficiency. The Two-Way Valve comes in two pipe sizes: 1/8" and 1/4" Normally Closed (closed when de-energized) and 1/8" Normally Open (open when de-energized). The Three-Way Valve comes in one pipe size only: 1/8". Both are standard in brass or stainless steel. Permissible pressures: Two-Way Valves up to 300 lbs./sq. in. (AC) and up to 250 lbs./sq. in. (DC); Three-Way Valves up to 125 lbs./sq. in. (AC) and up to 50 lbs./sq. in. (DC). Adjustable Main Flow and By-Pass Flow available for Two-Way Valves. Twenty-Four inch (24") leads.

If you have been looking for a really small and really efficient solenoid valve, one of these two ASCO Midget Valves may be just what you need. We'll be glad to send you complete information (Bulletins 8262 and 8314) but in writing will you tell us something about your requirements?

ASCO Solenoid VALVES

Automatic Switch Co.

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See the Reinhard Commercial & Industrial Gas Conversion Burners

At the International Heating & Ventilating Exposition

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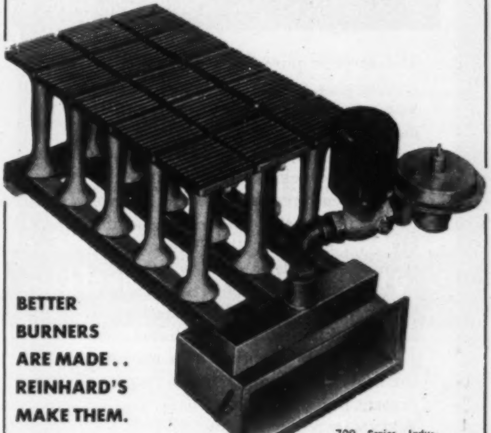

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BETTER BURNERS ARE MADE . . REINHARD'S MAKE THEM.

The Gas Conversion Burner Of Easy, Easy Installation

Reinhard Industrial and Commercial Gas Conversion Burners are noted for their ease of installation, no matter what type of installation is required. We manufacture models to meet the requirements of almost any boiler.
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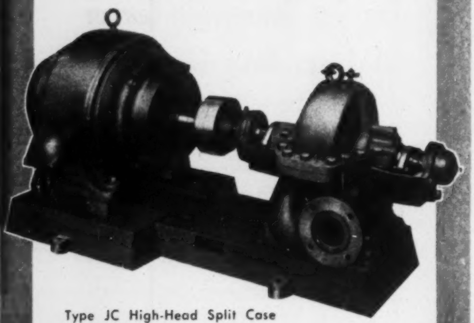
Unless your pumping installation incorporates the right basic design, you're pumping away money. The outstanding feature of WEINMAN Centrifugal pumps is the soundness of their basic design. WEINMAN engineered features make these pumps perform most efficiently . . . dependably . . . economically. The men responsible for these designs specialize in one product — Centrifugal pumps but their knowledge covers and benefits all industries, yours included.

You may be surprised to learn what the *right* basic design can do for your present pumping operations. A nearby WEINMAN representative can give you facts and figures. Contact him by mail, wire or phone TODAY!



Type JC High-Head Split Case Pump . . . two stage, back to back, impeller design . . . Capacity up to 600 G.P.M., Heads to 600 feet.

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Built by Centrifugal Specialists

The WEINMAN Pump Mfg. Co.

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RECENT TRADE LITERATURE

For your convenience in obtaining copies of these bulletins, see coupon on page 273. If you write direct to the manufacturer, describe carefully what literature you want, as the number given first in each item is for use only when sending requests to Heating, Piping & Air Conditioning.

Arc Welder

HPAC 101—Available in 300 amp and 400 amp sizes, the "Shield-Arc SAE" gasoline engine driven welder of Lincoln Electric Co., Cleveland 1, Ohio, is briefly described and illustrated in a new data sheet. Specifications, dimensions, and design and construction features are given.

Automatic Controls

HPAC 102—Publication F-4365 of Barber-Colman Co., Rockford, Ill., is a 24 page booklet which briefly outlines types and applications of automatic controls used in heating, ventilating, and air conditioning systems. Fundamental principles of operation and application are given for self actuated, electric and pneumatic controls. The basic operations and functions of two position, floating, and proportioning or modulating controls are described and illustrated.

Blowoff Valves

HPAC 103—Bulletin B-433 of Yarnall-Waring Co., Mermaid Lane, Philadelphia 18, covers the company's line of blowoff valves which are designed for working steam pressures from 400 to 2500 psi. Design and construction features, dimensions, and other pertinent data are given for type C seatless valves, hard-seat valves, and unit-tandem valves.

Chemical Feeders and Flow Instruments

HPAC 104—BIF Industries, P. O. Box 1340, Providence 1, R. I., has released Bulletin BIF-1 which briefly describes various products and corresponding descriptive literature offered by its subsidiary companies. Equipment covered includes the chemical proportioning units of % Proportioneers Inc. %, the volumetric and gravimetric feeders for dry materials and the feeding of liquids by gravity, available from Omega Machine Co., together with the venturi meters and instruments for metering and controlling flow, liquid level, temperature pressure, and weight of Builders-Providence, Inc.

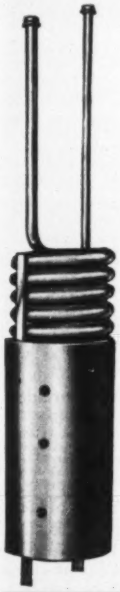
Chilled Water Storage Units

HPAC 105—"Ice-Cel" units of Dole Refrigerating Co., 5910 N. Pulaski Rd., Chicago 30, are chilled water storage units designed to utilize off-peak capacities of refrigerating equipment and to make available chilled water for peak loads. Engineering Bulletin 8-ES gives technical data on applications in connection with air conditioning and product cooling. Sample problems are worked out for selecting equipment for a variety of applications.

Condenser Pumps

HPAC 106—Condenser circulators, in standard sizes to 100,000 gpm and in special sizes to 200,000 gpm, are

HERE'S THE SOLUTION TO BULK TANK OIL PREHEATING!



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"Hot Spot"

Storage Tank Preheater

All-steel shell and coil assembly for preheating No. 5 and Bunker "C" oils to proper flow temperature in bulk storage. Suction pipes, inlet and outlet pipes for heating go through manhole cover.

POSITIVE PREHEATING

Heats with either steam or hot water. Oil or other liquids enter preheater from the bottom and pass over coils into flow accumulator before entering suction line. Connections furnished for any diameter tank. Made with 14" and 16" diameter shell.

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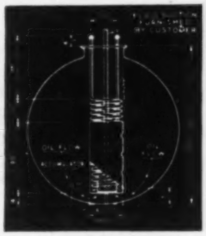
Write — wire for full details.



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...keeps **Western Rotary Turbine Ventilators** in operation, providing constant 'round-the-clock exhaust. Western's lifetime-guaranteed bearings are both mounted on the same axis...always stay in alignment...stand up to shipping jolts. Throat sizes from 6" through 48". The typical, clean, attractive silhouette that progressive industry demands. Western turbo-ventilation...high in efficiency, low in cost.

Request our catalogue for information, sizes, capacities, price lists. In 1950 Sweets and A. E. C. Jobbers are invited to participate in our national sales system.

"Always on the job—never on the payroll"

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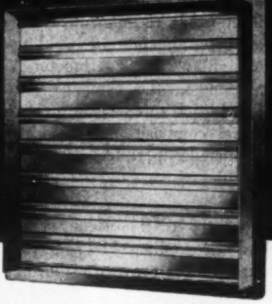
1726-28 E. WASHINGTON BLVD. LOS ANGELES 21 CALIF.

they all want **AIR-FLO**



MODEL A-555

THE AUTOMATIC SHUTTER WITH ALL THE FEATURES

FRONT VIEW—CLOSED

IT TAKES THE LOAD OFF THE FAN!

Aluminum louvers open fully, permitting capacity fan operation. New heavy reinforcement strip adds strength and long life to the louvers, assures quiet operation and perfect counterbalance, prevents rattling. Deep shroud protects shutter from high winds. Tie-rod, brackets and bearings inside frame, not exposed to weather. Special finish resists corrosion. Many other features.

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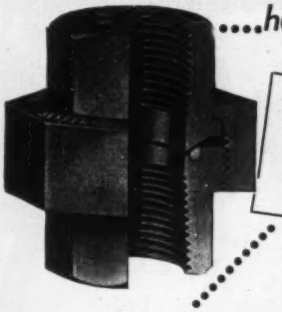
Illustrations and details of the complete Air-Flo line.

AIR CONDITIONING PRODUCTS CO.

2340 W. LAFAYETTE BLVD. • DETROIT 16, MICH.



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Save Space in Tight Spots

JEFFERSON SPECIALTY UNIONS

Close fits are simple with Jefferson Unions . . . and once in they'll STAY in because we make them from a very fine malleable iron with a tensile strength of 55,000 lbs per sq in. Details such as the machining instead of casting the ring channels . . . making the rings from special tubing instead of casting them and testing all fittings with air before delivery all add up to a minimum of maintenance after the installation. You're sure the job's in to stay when the joints are made with Jefferson Specialty Unions.

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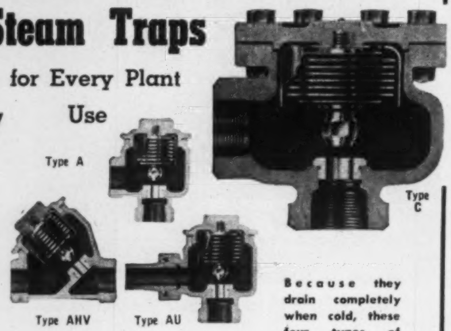
NICHOLSON MAKES
FREEZE-PROOF
Steam Traps
for Every Plant
Use



Because they drain completely when cold, these four types of Nicholson steam traps are positively freeze-proof. Can be freely installed outdoors. Universally recommended for use in lines which need not be in continuous use during cold weather, because they are freeze-proof and because their 2 to 6 times average drainage capacity results in minimum heat-up time. The non-air-binding feature of Nicholson traps also notably facilitates steam transfer in severe weather. Size ¼" to 2"; press. to 225 lbs.

BULLETIN 450

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Valves ★ Traps ★ Steam Specialties

In order to give You
MAXIMUM SERVICE
Register and Grille Mfg. Co., Inc.
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14 different styles for Air Conditioning have recently been Standardized...Write for Catalog with over 150 illustrations.

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illustrated and described in a new catalog (No. G-1050) issued by Economy Pumps, Inc., Div. of Hamilton-Thomas Corp., Hamilton, Ohio. Designed for power station service, the pumps are vertical mixed-flow units of large capacity and low head.

Electric Glass Radiant Heat Panels

HPAC 107—The Appleman Glass Works, Bergenfield, N. J., is marketing six types of "Electriglas" radiant heat panels, including the new baseboard type panels. The company has recently prepared a computation guide which gives the watt requirements and approximate watt consumption of any given installation. The guide is first used to find the heat loss of a room, and from this the wattage required may be determined.

Float Traps

HPAC 108—Bulletin No. 950 of V. D. Anderson Co., 1949 W. 96th St., Cleveland 2, gives specifications, capacities, pressures, sizes, and prices of three float traps offered for draining condensate from steam equipment as well as moisture from air and gas equipment. Also shown are cross sections of float traps, air release valves, strainers, and "Super-Silvertop" steam traps.

Forged Pipe Fittings

HPAC 109—Bulletin S-1 of Watson-Stillman Co., Roselle, N. J., gives details on the company's line of stainless and alloy forged steel fittings. Sizes, dimensions, and chemical and physical properties are given for these fittings which are offered in both the screw and socket welding types. Standard alloys carried in stock include types 304, 316, and 347 stainless steels, various carbon-molybdenum alloys, monel metal, and nickel alloys. A number of pressure-temperature charts give adjusted service ratings for water, steam and oil service, and several pages are devoted to useful information, such as data on American Standard pipe threads, information on the minimum size of 45 deg fillet welds recommended for static conditions, and approximate amounts of welding rods required per joint. A similar catalog (Bulletin A3-50) gives complete information on the company's line of forged steel fittings. In addition to covering pressure ratings, dimensions, chemical compositions, physical properties, etc., the booklet includes pertinent excerpts from the Code for Pressure Piping.

Gas Meter Flow-Time Table Card

HPAC 110—Reinhard Bros. Co., 11-17 S. 9th St., Minneapolis, manufacturer of gas conversion burners, has prepared a gas meter flow-time table card. By timing the number of seconds required for one revolution of a conventional gas meter test dial the gas flow in cubic feet per hour may be read from the card. Data are given for use in connection with test dials of ½, 1, 2, or 5 cu ft size. On the reverse side of the card are tabulated capacities of orifices in cubic feet per hour for gas having a specific gravity of 0.60. Information is given for use with gases of other specific gravities.

Low Temperature Welding

HPAC 111—The 43 page handbook on "Eutectic" low temperature welding alloys has been reprinted by Eutectic Welding Alloys Corp., 40 Worth St., New York 13. In

Janette
Blower Wheels
5 in. to 12 in.

DISTINCTIVE FEATURES—The soft steel blades are made in pairs, pressed thru slots in the heavy steel back plate, then welded to the plate. The blade tips are pressed thru slots in the inlet disc then bent back against the spring of the steel blades. This ***patented construction*** results in an exceptionally rigid wheel and ***prevents loose blades,*** as no rivets are used in fastening the blades. The heavy cast iron machined hub is riveted to the back plate and will not crack or become loose on the shaft.

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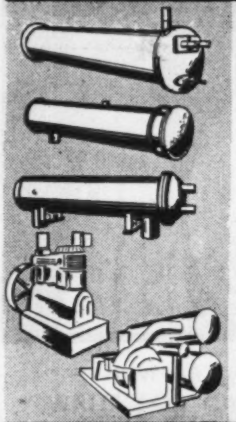

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CONDENSERS AND
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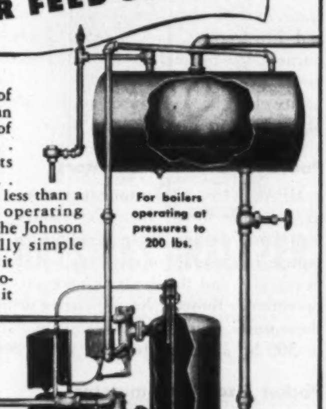
High Temperature
BOILER FEED SYSTEM

Imagine a system of boiler feeding that can achieve fuel savings of 20% and more . . . slash pumping costs as much as 60% . . . save its own cost in less than a year! That's what operating records show about the Johnson System. It's basically simple and sound in *how* it works, yet truly revolutionary in what it accomplishes. Engineered and serviced by a nationwide organization.



For boilers operating at pressures to 200 lbs.

Don't fail to write for the facts. Better yet, let us survey your needs without obligation.

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world's largest selling gas unit heater

Hung from ceiling
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UNIT HEATER
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Are you selling more unit heaters resulting from the increased demand in your area? You can! . . . if you sell the world's most popular unit heater with the help of Reznor's new booklet, "The Inside Story." Shows you how to present convincingly Reznor's superior features. Then point up Reznor's exclusive "Airform" heat exchanger . . . the heat exchanger that pushes out all the heat produced. Made of *aluminized steel;* it resists temperatures of 1250° F., *a 42% safety margin!*

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The New Aluminum
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Protrudes only 1⅛" from Wall

- Smart looking, protrudes only 1⅛".
- 615 B.T.U. per lineal foot with 170° water temperature.
- Fins have amazing heat area due to exclusive beading process which provides greater radiation surface and durability.
- 5 ft. standard unit weighs only 12 lbs. . . . requires only 3 simple wall brackets to install. Easily cut to any desired length.
- Closed top and open front prevent streaking wall.
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DUAL SWITCH THERMOSTAT

MODEL NWDH for Controlling Air Conditioning Systems!

The Type NWDH dual switch thermostat with remote bulb for duct mounting is being used in applications in which it is desired to handle two electrical circuits from a single thermal assembly. Typical installations include the control of two compressors, one for normal operation and one for peak loads; or a fan and a compressor.

Standard switches are rated at 15 amps 125/250 V. AC. Switches rated at ¾ hp 125 V. AC, 1½ hp 250 V. AC are also available.

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87 School Street
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Whatever your control problem may be, United Electric Controls Co. is prepared to assist you. Send full details and drawings. Write for bulletin giving complete details on the control mentioned above.

STANDARD & SPECIAL THERMOSTATS & PRESSURE SWITCHES

addition to technical data on characteristics, properties, applications, and operational procedures for the company's alloys and fluxes, the manual contains a good deal of general information on the art of welding. Requests for copies should be in writing and sent to the company.

Measuring Instruments

HPAC 112—Gotham Instruments Div., American Machine & Metals, Inc., 233 Broadway, New York City, has issued a number of new catalogs (Nos. 100, 200, 300, 400, and 500). Instruments covered include industrial thermometers, dial thermometers, indicating thermometers, pressure gages and recorders, temperature controllers, etc. The booklets give detailed information and are indexed for quick reference.

Mechanical Packings

HPAC 113—A new 32 page, illustrated catalog of Flexrock Co., 36th & Filbert Sts., Philadelphia 4, describes the company's line of mechanical packing. The booklet includes a simplified recommendation chart and features process packing which is said to be self-forming, self-lubricating, and self-sealing. Requests for the catalog should be forwarded directly to the manufacturer and should be written on your company letterhead.

Metallic Bellows

HPAC 114—An article on what to consider when selecting a metallic bellows, by A. H. Ellis and J. H. Howard, both of Clifford Mfg. Co., 152 Grove St., Waltham 54, Mass., has been reprinted and is available from the company. Factors discussed include type of construction, materials, flexibility, filling medium, life, and applications.

Oil Burners

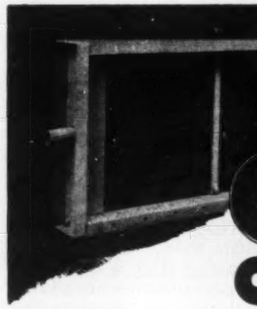
HPAC 115—Catalog F of Ray Oil Burner Co., 401-499 Bernal Ave., San Francisco 12, features the company's viscosity control system for its oil burners. According to the catalog, a number of design changes have recently been made. Catalog G, covering the company's fully automatic burners, has been re-issued with substantial changes and illustrations, and Catalog J covers direct drive oil burners for manual or semi-automatic operation. Three new types have been added to this line and a large capacity chart has been incorporated, along with descriptions of equipment used with the units.

Packaged Steam Generators

HPAC 116—The automatic, packaged steam generators of Johnston Bros, Inc., Ferrysburg, Mich., are of the waterback design, three-pass, Scotch type. They incorporate horizontal rotary type oil burners designed for heavy oils and the controls necessary for fully automatic operation. Bulletin No. 507 gives detailed information on these units which are available in various sizes from 60 to 500 hp and for pressures up to 200 psi.

Pocket Size Volt-Ammeter

HPAC 117—A 16 page folder (No. 110) on the "Amprobe" is now available from Pyramid Instrument Corp., 49 Howard St., New York 13. The device is a pocket size, snap-on volt-ammeter recommeded for use in connection with the installation, repair, servicing and maintenance of electrical equipment.



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A full line of sizes now available to meet all industrial requirements. Send for catalog.

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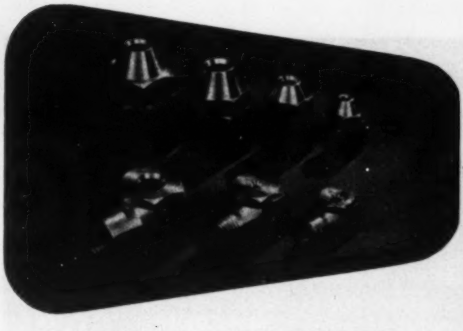

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Delavan now offers a complete line of spray nozzles and accessories to meet every spraying requirement. The name Delavan is your assurance of top quality and outstanding performance.

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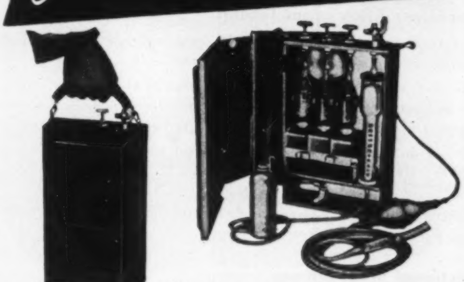

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The Hays gas analyzer (or Orsat) tells if oil burner or stoker is properly installed—or if combustion is at maximum efficiency. Gives *accurate* readings of draft, CO_2 and flue gas temperature. Available in several styles from the single to the multiple chamber model shown which analyzes CO_2, O_2 and CO. All sizes available from stock. Write for helpful literature . . . FREE!

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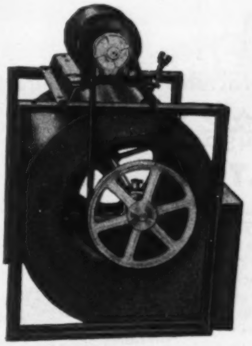

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MASSACHUSETTS . .

By changing the position of the oil cup, the four popular discharges (lower horizontal, upper horizontal, down-blast and up-blast) can be obtained. Sizes 7 to 16½ inches wheel diameter.

WRITE FOR BULLETIN No. 110 CATALOG

MASSACHUSETTS BLOWER DIVISION
The* BISHOP & BABCOCK *Mfg. Co.
4901 HAMILTON AVENUE CLEVELAND 14, OHIO

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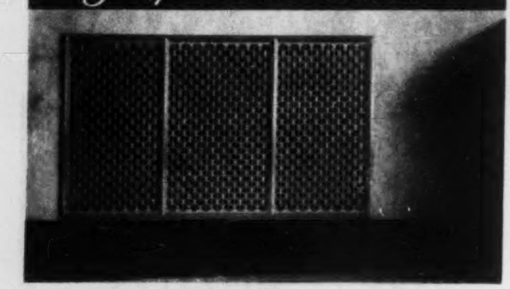

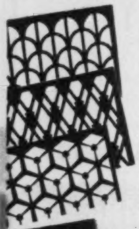

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Perforated in finely finished, unbreakable metal plates, these Grilles of harmonious beauty and richness will render years of enduring service.

A wide selection of distinguished modern and classical patterns is available in brass, bronze, steel, stainless steel, aluminum, monel, nickel silver and other metals.

There is practically no limitation to the size, shape or form of Grilles we can furnish. They may be rectangular, square, round or odd in shape and flat, curved or angular in form.

Frames, louvers, invisible hand hole doors and registers can be furnished to meet exacting specifications.

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The Harrington & King Perforating Co

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by Manufacturers and Architects

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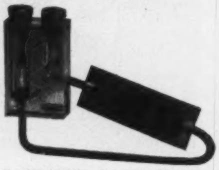
AIR FILTER GAGES

Recommended by leading air filter manufacturers, DWYER Gages warn against over-accumulation of dust and dirt which increase filter resistance . . . show proper time for cleaning or replacing air filters . . . thus prevent air delivery from dropping below permissible minimum flow.

Because there are no complicated three-way valves for venting to Zero, DWYER Gages are permanently accurate. Over-Pressure Safety Traps, a DWYER exclusive, prevent loss of fluid at all times. Solid transparent plastic body insures highest visibility.

For complete information, ask for DWYER Bulletin No. 187



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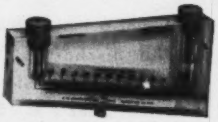

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Price (complete with accessories) $23.50

F. W. Dwyer Mfg. Co.

323 SOUTH WESTERN AVE., CHICAGO 12, ILL.

Prevention of Galvanic Corrosion

HPAC 118—"Elno" anodic rods are made of magnesium alloy with an iron wire core. They are offered for use in hot water storage tanks for the prevention of galvanic corrosion. A new folder prepared by Cleveland Heater Co., 2310 Superior Ave., Cleveland 14, gives detailed information.

Protective Coating

HPAC 119—"Carbo-Kote" 6020 is a room temperature thermosetting corrosion resistant resin. It is a brush-on tank lining and floor surface coating which is said to have unusual resistance to the corrosive action of acids, alkalies, and solvents, and is particularly recommended for unjacketed steel process tanks, storage tanks, pump bases, fan blades, fan housings, fume hoods and ducts, etc. Data Sheet C-42 of Carboline Co., 7603 Forsyth Blvd., St. Louis 5, gives detailed information.

Ratio Totalizer

HPAC 120—Twelve suggested applications in automatic control circuits for its new ratio totalizer are described and illustrated by diagrams in a new bulletin (No. 5450) now available from Hagan Corp., Hagan Bldg., Pittsburgh 30. The device is a pneumatically operated control mechanism for combining input control pressures and spring forces to produce a single output control pressure. Applications in computing circuits include addition, subtraction, multiplication and division, averaging, and reversal of loading pressure. For regulation and control action, it can be used to obtain a proportional band action, with automatic reset if required, a rate action, or a combination of proportional band plus automatic reset plus rate action. Specialized applications include selector action, pressure splitting, and pneumatic toggle switching.

Seamless Alloy Steel Tubing

HPAC 121—A new technical data card on the chemical compositions of seamless alloy steel tubing, specifically "Croloy"steels of the low and intermediate alloy groups, is available from Babcock & Wilcox Tube Co., Beaver Falls, Pa. The tubing is used for high temperature service and for use in heat exchangers, condensers, refinery stills, boilers and superheaters. The card, identified as TDC 136, gives information on the carbon, manganese, phosphorus, sulphur, silicon, chromium, and molybdenum contents.

Sectional Steel Boilers

HPAC 122—The new four page bulletin on sectional steel boilers of Central States Steel Boiler Co., 4649 W. Harrison St., Chicago 44, gives tabulated data on 21 sizes ranging up to 50,000 EDR, steam. Units are constructed so that shop prefabricated parts are assembled and welded on the job by factory crews. Sections can be carried through any standard door and all boilers are constructed in accordance with the ASME code.

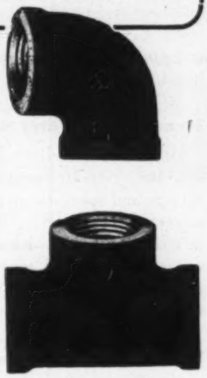
Stainless Steel Pipe Fittings

HPAC 123—Catalog 120C of Camco Products Inc., 25 Fox St., New Haven 13, Conn., gives dimensions, prices, nominal sizes, and other data on the company's line of stainless steel screwed, flanged, and welding fittings. All

Your jobs deserve the best... that means

RHODE ISLAND

MALLEABLE FITTINGS



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RADIANT HEAT

- **QUICKER . . EASIER INSTALLATION**
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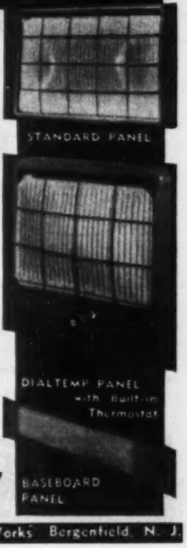

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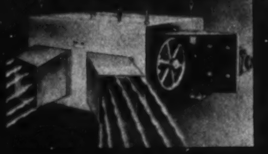

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FOR HEAVY-DUTY HEATING IN FACTORIES, WAREHOUSES, OFFICES

Ceiling mounted CHROMALOX Electric Blower-Type Heaters are your quick, easy answer to space heating! Twin centrifugal fans, driven by a 3-phase motor, distribute warmth evenly over large areas. Air ducts can be used to convey heated air to desired locations. Automatic thermal cutout assures protection against overheating. 51,180 to 136,480 BTU output per hour.

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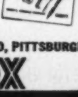

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CHROMALOX 68-19

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Catalog 23 . . . Pneumatic Atomizing Nozzle Catalog

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Thread and gasket connections on oil lines . . . either hot or cold . . . or high pressure steam lines . . . will not leak when sealed with Key Graphite Paste.

This sealing compound expands when it is heated, forming a perfect seal. Assembled joints will not freeze in service. Key preserves threads and gaskets and, above all, it is economical to use because it goes several times further than ordinary pipe dopes.

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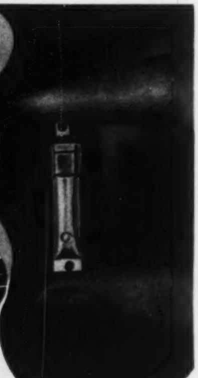
AGAINST OVERLOAD AND OVERHEATING..

with the

MIGHTY MITE THERMOSTAT



Specify Mighty Mite to stand effective guard over your product. Enjoy *these advantages*: pre-calibrated to your exact requirements, accurate control; small enough to insert in motor winding without alteration of housing, low installation cost; true dependability of operation, proved by a million installations; no rivets, eyelets, screws, solder, or fiber; dust-proof, moisture-proof, tamper-proof.

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A MIGHTY MITE MOTOR IS A SAFE MOTOR

fittings are available in types 304, 316, and 347 stainless. Data on welding fittings are tabulated for featherweight and schedules 5, 10, 40 and 80 fittings.

Standard Steel Lists

HPAC 124—Babcock & Wilcox Tube Co., Beaver Falls, Pa., is offering a revised edition of combined standard lists of AISI and SAE steels. This four page technical data card (No. 119C) covers basic open hearth and acid-bessemer carbon steels and resulphurized carbon steels, open hearth and electric furnace alloy steels, and stainless and heat resisting steels, subject to standard variations for check analysis. Percentages of chemical composition limits and other elements are stated for each of the various steels listed.

Steam Mixer Water Heaters

HPAC 125—Bulletin SM-41 of O'Brien Steam Specialty Co., Inc., 301 Heffernan Bldg., Syracuse 2, N. Y., gives ratings and specifications for five sizes of all-bronze steam mixer water heaters. These are packaged units which mix steam directly with water to provide instantaneous hot water at controlled temperatures. Also described is the company's combination safety unit which supplies hot water at two or more controlled temperatures.

Variable Speed Transmission

HPAC 126—Revco Inc., 407 Thorpe Bldg., Minneapolis 2, has prepared a new bulletin on the "Zero-Max" infinitely variable speed transmission. Information is given on new models with torque ratings up to 120 in.-lb, and the principle of operation is described. A table gives general recommendations for the types of torque converters to be used with motors having various speeds and horsepowers.

Venting Gas Appliances

HPAC 127—A new 22 page booklet dealing with the basic requirements for proper venting of gas appliances is available from Metalbestos Div., William Wallace Co., Belmont, Calif. Five basic rules for installing gravity vents are given and the importanec of keeping the flue gases hot and the use of correct flue sizes are stressed.

Vibration Pads

HPAC 128—"Unisorb" is a material developed by Felters Co., 210 South St., Boston 11, for simplifying the anchoring of machines on all types of floors and for controlling transmitted vibration and noise. Pads are cemented to the floor and to the machine. A new 16 page booklet describes and illustrates numerous installations in various plants.

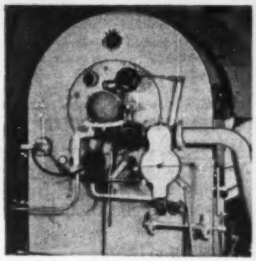
Water Clarification

HPAC 129—Publication No. 5001 of Cochrane Corp., 17th St. and Allegheny Ave., Philadelphia 32, describes the "Liquon" sludge contact reactor, a water conditioning apparatus which operates on the principle that previously formed precipitates added in the form of a sludge or slurry will accelerate reactions. The bulletin describes the operation of the unit, illustrates and describes the types of equipment available, and gives a list of applications, with a separate page on waste recovery.

W. N. BEST · COMBUSTION EQUIPMENT · CALOREX

INDUSTRIAL BURNERS

PACKAGED BURNERS for OIL, TAR, GAS and combination OIL & GAS



BEST packaged Rotary cup burners are ideal for installations where simple conversion at will to gas or oil is desired. And BEST Engineering Consul will result in top fuel efficiency.

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Handy Expando Tube End Expander Eliminates Coupling and Reduces Soldering Time

At last! Here's a new method of connecting copper, aluminum and steel tubing. Not only does it cut time and material costs, but it eliminates the coupling which requires fitting and cleaning. A few easy turns of Expando's handle and it quickly expands the tube's end so that it fits within .002 of an inch . . . and easily slips over the end of the connecting tube. Think of it! One soldering . . . no coupling . . . a real time and money saver! Handles tube sizes ⅜, ½, ⅝ and ¾. Immediate Delivery!

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- FASTENS DIRECTLY TO THE OUTER WALL
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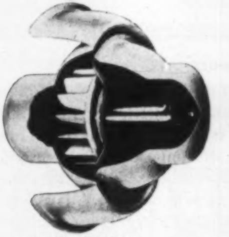
ALSO Explosion Proof Models for hazardous locations



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Spray Method

Reduces Air Conditioning Loads as much as 25%
Lowers Temperatures of Upper Floors 10° to 15°
For Industrial, Commercial and Residential Bldgs.
Used on all Types and Shapes of Roofs
Installation is Simple, Inexpensive and Foolproof
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Besides cooling "under-roof" areas, April Showers adds longer life to the roof, gives added protection in case of fires and acts as a lightning arrestor. WRITE for detailed technical data.
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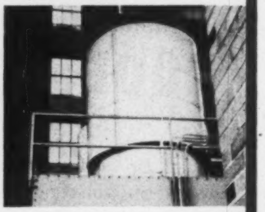

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Water Softener

HPAC 130—Cochrane Corp., 17th St. and Allegheny Ave., Philadelphia 32, has issued Publication 4505 on its "Junior" industrial zeolite softener. The bulletin illustrates and describes a water softening apparatus recommended for small boiler and industrial plants, laundries, hospitals, apartment houses, etc., where relatively small quantities of softened water (less than 100 gpm) are required.

Welder

HPAC 131—A new bulletin (W-71-1), covering the model TR-180A a-c welder, has been issued by Harnischfeger Corp., Welding Div., 4400 W. National Ave., Milwaukee 14. It lists the features of this limited input welder and illustrates a number of applications. The welding service ranges from 20 to 180 amp and the unit incorporates the company's "Dial-lectric" heat control.

Welding Clamps

HPAC 132—Two new catalog sheets, prepared by Adjustable Clamp Co., 433 N. Ashland Ave., Chicago 22, cover the "Jorgensen" and "Pony" welding clamps. In addition to C clamps and bar clamps, special shielded welding clamps are featured. These have a steel shield over the clamp screw to protect the threads from spatter and from direct contact with the torch itself.

Welding Electrodes

HPAC 133—Bulletin R7-8 of Harnischfeger Corp., Welding Div., 4400 W. National Ave., Milwaukee 14, is a 56 page electrode guide which describes each of the company's electrodes, gives typical applications and available sizes. A comparative chart lists corresponding types of electrodes.

Welding Torches

HPAC 134—Air Reduction Sales Co., Div. of Air Reduction Co., Inc., 60 E. 42nd St., New York 17, is offering a new catalog (Form ADC-702) on hand torches for gas welding and cutting. The 36 page booklet contains information on the company's line of welding and cutting torches, outfits, tips, and accessories.

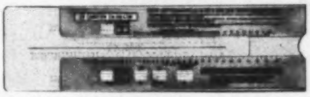
Lists 150 References to Papers Published On Solar Heating

Bibliography on Domestic and Industrial Applications of Solar Heating is an annotated bibliography of about 150 references listing most of the important English and foreign papers published on the various aspects of solar heating between 1930 and the middle of 1950. Part I includes general and historical articles as well as papers on various industrial applications such as utilization of solar energy for boilers, metallurgical furnaces, and drying in the chemical, ceramic and food industries, together with electric power generation, refrigeration, distillation, etc.

Part II is devoted to the solar heating of houses by the different methods of storing solar heat, the design and construction of solar-oriented houses, and the design, construction and use of solar water heating devices.

This ESL Bibliography No. 7 may be purchased from the Engineering Societies Library, 29 W. 39th St., New York 18, for $2.00.

AIR-CONDITIONING CALCULATOR



Accurately determines all important properties of air easily and quickly—works like a slide rule, reads like a chart. Figures temperature values, sensible heat, volume, total heat, grains of moisture, latent heat, volume of vapor etc. Price $4.00 including complete Booklet on Air-Conditioning Fundamentals. Order today from

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HEATING, PIPING & AIR CONDITIONING

6 N. Michigan Ave. Chicago 2, Ill.

agents wanted

WANTED — A.S.H.V.E. members or Registered Engineers as associates for representation in following areas: Rochester, N. Y., Baltimore, Boston, Wilmington, Del.; and Southern part of N. J. Thermal controls. Air mail replies. Address Key #884-A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave., Chicago 2.

for sale

Distributor close-out nationally known oil burning circulating heaters and floor furnaces. Circulators 54,000 and 70,000 Btu's. Floor furnaces 54,500 Btu's. Fast delivery guaranteed. Write Key #887-A, Heating, Piping & Air Conditioning, 6 No. Michigan Ave., Chicago 2.

100 Automatic Pressure Regulating Water Valves ½" and ¾". Removed from New Chrysler Airtemp Air Conditioners where we installed cooling tower. Valves never used. Make offer for entire lot. Address Theodore M. Williams Company, 979 Volusia Avenue, Daytona Beach, Florida.

A city within a city...

HEATED BY 15 GAS FIRED

KEWANEE

STEEL BOILERS

● "Stonestown," in San Francisco's famous Lake Merced section, is actually a City within a City. This $20,000,000 development with its fourteen apartment buildings provides homes for 700 families, plus a 40 acre business and shopping area with parking space for 2500 cars.

Heat, plus ample hot water for kitchens, bathrooms and laundries, is provided by 15 Kewanee Steel Boilers equipped with Kewanee Submerged Tankless Hot Water Coils . . . another typical example of an outstanding modern project where Kewanee was selected for dependable, economical heat.

"STONESTOWN"
Apartment Project
San Francisco, Calif.

Architect:
ANGUS McSWEENEY
Burlingame, Calif.

Engineer:
C. H. BAZILLE
San Francisco, Calif.

Heating Contractor:
L. J. KRUSE CO.
Oakland, Calif.

● A view of two boiler rooms showing three of the 15 Kewanee Steel Boilers installed in the Stonestown Project. With a total output of more than 24 million Btu, these boilers provide both heat and domestic hot water for the entire project.

See Our Exhibit . . . Space A
10th International Heating & Ventilating Exposition
January 22-26 — Philadelphia

KEWANEE BOILER CORPORATION

BOILERMAKERS 80 YEARS KEWANEE, ILLINOIS
Branches in 60 Cities — Eastern District Office: 40 West 40th Street, New York City 18
Division of American Radiator & Standard Sanitary corporation

Serving home and industry

AMERICAN STANDARD · AMERICAN BLOWER · CHURCH SEATS · DETROIT LUBRICATOR · KEWANEE BOILERS · ROSS HEATER · TONAWANDA IRON

SECTION OF JANUARY 1951 HEATING, PIPING & AIR CONDITIONING

1951 DIRECTORY

HEATING, PIPING, AND AIR CONDITIONING EQUIPMENT FOR INDUSTRIAL, COMMERCIAL, INSTITUTIONAL AND PUBLIC BUILDINGS

PART 1–PRODUCTS CLASSIFIED–Page 2d

If you want to know the names of one or more manufacturers making a certain product, look in Part 1, where products are classified alphabetically in "directory style" with the noun governing (for instance, "unit heaters" are listed under "heaters, unit").

PART 2–TRADE NAMES–Page 94d

If you have the trade name of a product and want to know who manufactures it, look in Part 2, where trade names are alphabetically listed. Trade names the same as or identifiable from the company name are not listed. Manufacturers with such trade names can be easily identified under their product classification in Part 1.

PART 3–MANUFACTURERS' ADDRESSES–Page 110d

For the complete name and address of any manufacturer look in Part 3.

● The manufacturers whose names are spotted throughout the listings advertise in this issue. See Index to Advertisers (on page 127d) for the page on which you will find the advertising of any of these manufacturers.

Heating, Piping & Air Conditioning
6 N. Michigan Ave.
Chicago 2, Illinois

DIRECTORY SECTION

HEATING, PIPING, AND AIR CONDITIONING EQUIPMENT FOR INDUSTRY AND LARGE BUILDINGS

PART 1

PRODUCTS CLASSIFIED

If you want to know the names of one or more manufacturers making a certain product, look here in Part 1, where products are classified alphabetically in "directory style" with the noun governing (for instance, "unit heaters" are listed under "heaters, unit").

Heating, Piping & Air Conditioning
6 N. Michigan Ave.
Chicago 2, Illinois

ABSORBERS, VIBRATION

See Hose, Metal and Fittings; Bases and Pads, Vibration Isolating

ABSORBERS, VIBRATION, FOR REFRIGERANT LINES

- American Metal Hose Branch, The American Brass Co., Waterbury, Conn.
- Atlantic Metal Hose Co., Inc., New York, N. Y.
- Bendix Aviation Corp., Eclipse—Pioneer Div., Teterboro, N. J.
- Chicago Metal Hose Corp., Maywood, Ill.
- Finn & Co., New York, N. Y.
- Firestone Industrial Products, Akron, O.
- Packless Metal Products Corp., New Rochelle, N. Y.
- Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.
- Pleasantaire Corp., Washington, D. C.
- Seamlex Co., Inc., Long Island City, N. Y.
- Techniflex Corp., Port Jervis, N. Y.
- Titeflex, Inc., Newark, N. J.
- United Metal Hose Co., Inc., Long Island City, N. Y.
- Wade Mfg. Co., Elgin, Ill.

ABSORPTION DEHUMIDIFIERS

See Dehumidifiers, Absorption and Adsorption

ABSORPTION REFRIGERATION MACHINES

See Machines, Refrigeration, Absorption

ACCESS DOORS AND PANELS

See Doors and Panels, Access

ACCUMULATORS, REFRIGERATION (FOR AIR CONDITIONING)

- ●Acme Industries, Inc., Jackson, Mich.
- ●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
- Dole Refrigerating Co., Chicago, Ill.
- Doyle and Roth Mfg. Co., Brooklyn, N. Y.
- ●Frick Co., Waynesboro, Pa.
- ●Henry Valve Co., Melrose Park, Ill.
- McQuay, Inc., Minneapolis, Minn.
- ●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
- Phillips & Co., H. A., Chicago, Ill.
- Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa.
- Richmond Engineering Co., Inc., Richmond, Va.
- Roessing Mfg. Co., Pittsburgh, Pa.
- Techniflex Corp., Port Jervis, N. Y.
- Temprite Products Corp., Birmingham, Mich.
- Vilter Mfg. Co., The, Milwaukee, Wis.
- Wabash Mfg. Co., Chicago, Ill.
- Weatherhead Co., Cleveland, O.
- ●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
- XL Refrigerating Co., Chicago, Ill.

ADHESIVES, FOR PIPE COVERING

- Arabol Mfg. Co., New York, N. Y.
- ●Armstrong Cork Co., Lancaster, Pa.
- Cork Import Corp., Englewood, N. J.
- Flintkote Co., The, New York, N. Y.
- Foster Co., Benjamin, Philadelphia, Pa.
- Keasbey Co., Robert A., New York, N. Y.
- ●Miracle Adhesives Corp., New York, N. Y.
- Moore Inc., Goodloe E., Danville, Ill.
- Mystik Adhesive Products Div., Chicago Show Printing Co., Chicago, Ill.
- Pecora Paint Co., Inc., Philadelphia, Pa.
- St. Clair Rubber Co., Detroit, Mich.
- Sauereisen Cements Co., Pittsburgh, Pa.
- Standard Asbestos Mfg. Co., Chicago, Ill.
- Stic-Klip Mfg. Co., Cambridge, Mass.

ADSORBERS, ODOR

- Carbide and Carbon Chemicals Div., Union Carbide & Carbon Corp., New York, N. Y.
- ●Connor Engineering Corp., W. B., Danbury, Conn.
- Pur Air Div., American Solvent Recovery Corp., Columbus, O.
- Refinite Corp., Omaha, Neb.
- Tamms Industries, Inc., Chicago, Ill.

ADSORPTION DEHUMIDIFIERS

See Dehumidifiers, Absorption and Adsorption

AFTERCOOLERS, COMPRESSED AIR

- Adams Co., Inc., R. P., Buffalo, N. Y.
- American Locomotive Co., Alco Products Div., New York, N. Y.
- American Moistening Co., Providence, R. I.
- Andale Co., Philadelphia, Pa.
- Armstrong Co., Richard M., Westchester, Pa.
- Bethlehem Steel Co., Bethlehem, Pa.
- Brown Fintube Co., The, Elyria, O.
- Bury Compressor Co., Erie, Pa.
- Chicago Pneumatic Tool Co., New York, N. Y.
- ●Condenser Service & Engineering Co. Inc., Hoboken, N. J.
- Croll-Reynolds Engineering Co., Inc., New York, N. Y.
- ●Davis Engineering Corp., Elizabeth, N. J.
- Downington Iron Works, Downington, Pa.
- Doyle and Roth Mfg. Co., Brooklyn, N. Y.
- Electric Sprayit Co., The, Sheboygan, Wis.
- Goodyer Industries, Inc., Chicago, Ill.
- Graham Mfg. Co., Inc., New York, N. Y.
- Griscom-Russell Co., The, New York, N. Y.
- Halstead & Mitchell, Pittsburgh, Pa.
- Heat-X-Changer Co., Inc., The, New York, N. Y.
- Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
- Industrial Mfg. & Engineering Co., Chicago, Ill.
- ●Ingersoll-Rand Co., New York, N. Y.
- Johnson Corp., The, Three Rivers, Mich.
- ●Joy Mfg. Co., Pittsburgh, Pa.
- ●Modine Mfg. Co., Racine, Wis.
- Murray Mfg. Co., D. J., Wausau, Wis.
- ●Niagara Blower Co., New York, N. Y.
- Parks-Cramer Co., Fitchburg, Mass.
- ●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
- Pennsylvania Pump & Compressor Co., Easton, Pa.
- Rome-Turney Radiator Co., Rome, N. Y.
- Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
- Ruemelin Mfg. Co., Milwaukee, Wis.
- Schramm, Inc., West Chester, Pa.
- Schutte & Koerting Co., Philadelphia, Pa.
- Standard Heater & Oil Equipment Co., Jersey City, N. J.
- Wilson Engineering Corp., Chicago, Ill.
- Worthington Pump & Machinery Corp., Harrison, N. J.
- ●Young Radiator Co., Racine, Wis.

AIR AFTERCOOLERS

See Aftercoolers, Compressed Air

AIR BREAK FITTINGS

See Fittings, Draining, Fixed Air Break

AIR CLEANERS

See Cleaners, Air, Electrical

AIR COMPRESSORS

See Compressors, Air

AIR CONDITIONERS

See Units, Air Conditioning

AIR CONDITIONING UNITS

See Units, Air Conditioning

AIR DIFFUSERS

See Diffusers, Air, High Velocity; Grilles; Panels, Perforated, for Air Diffusion; Registers

AIR ELIMINATORS

See Eliminators, Air

AIR FILTER CLEANING COMPOUNDS

See Compounds, Cleaning, Air Filter

AIR FILTER GAGES

See Gages, Air Filter

AIR FILTERS

See Filters, Air

AIR FRESHENING

See Compounds, Air Freshening; Adsorbers, Odor

AIR OPERATING VALVES

See Valves, Air Operating

AIR PURIFICATION

See Adsorbers, Odor

AIR RECOVERY EQUIPMENT

See Adsorbers, Odor

AIR SEPARATORS

See Separators, Air

AIR-TANKLESS WATER HEATERS

See Heaters, Water, Air-Tankless

AIR VALVES

See Valves, Radiators, Air

AIR VELOCITY METERS

See Meters, Air Velocity, Direct Reading; Anemometers

AIR VENTS

See Eliminators, Air

● Advertisement in this issue. See Index to Advertisers, page 127d

AIR VOLUME METERS

See Meters, Volume, Air and Gas

AIR WASHERS

See Washers, Air

ALARMS, HIGH AND LOW BOILER WATER

American District Telegraph Co., New York, N. Y.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Campbell Co., J. A., Long Beach, Calif.
Coral Designs, Long Island City, N. Y.
Defender Instrument & Regulator Co., St. Louis, Mo.
Diamond Power Specialty Corp., Lancaster, O.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Fischer & Porter Co., Hatboro, Pa.
Johnson Corp., The, Three Rivers, Mich.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Magnetrol, Inc., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
Northern Equipment Div., Continental Foundry & Machine Co., Erie, Pa.
●Penn Electric Switch Co., Goshen, Ind.
Preferred Utilities Mfg. Corp., New York, N. Y.
Reliance Gauge Column Co., Cleveland, O.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Schaub Engineering Co., Fred H., Chicago, Ill.
Unit Alarm Co., The, Elizabethton, Tenn.
Wright-Austin Co., Detroit, Mich.
●Yarnall-Waring Co., Philadelphia, Pa.

ALARMS, LIQUID LEVEL, AUDIBLE

American District Telegraph Co., New York, N. Y.
Automatic Control Co., St. Paul, Minn.
B/W Controller Corp., Birmingham, Mich.
Benjamin Electric Mfg. Co., Des Plaines, Ill.
Boston Auto Gage Co., Pittsfield, Mass.
Bristol Co., The, Waterbury, Conn.
Clark Controller Co., Cleveland, O.
Cutler-Hammer, Inc., Milwaukee, Wis.
Defender Instrument & Regulator Co., St. Louis, Mo.
Fischer & Porter Co., Hatboro, Pa.
Liquidepth Indicators, Inc., Long Island City, N. Y.
●Maid-O'-Mist, Inc., Chicago, Ill.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
Reliance Gauge Column Co., Cleveland, O.
Ripley Co., Inc., Middletown, Conn.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Scully Signal Co., Cambridge, Mass.
Uehling Instrument Co., Paterson, N. J.
Unit Alarm Co., The, Elizabethton, Tenn.
Wright-Austin Co., Detroit, Mich.

ALARMS, SMOKE

American District Telegraph Co., New York, N. Y.
Bailey Meter Co., Cleveland, O.
Brooke Engineering Co., Inc., Philadelphia, Pa.
●Combustion Control Corp., Cambridge, Mass.
Defender Instrument & Regulator Co., St. Louis, Mo.
De-Tec-Tronic Laboratories, Inc., Chicago, Ill.
Ess Instrument Co., Bergenfield, N. J.
Ess Specialty Corp., Bergenfield, N. J.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
General Power Plant Corp., New York, N. Y.
Instruments Associates, Inc., Brooklyn, N. Y.
McNeill Engineering Co., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
Ripley Co., Inc., Middletown, Conn.
Unit Alarm Co., The, Elizabethton, Tenn.
Worner Electronic Devices, Rankin, Ill.

ALGAE AND SLIME CONTROL, WATER TREATMENT FOR

See Treatment, Water, for Slime and Algae Control

ALUMINUM COATED SHEETS

See Sheets, Aluminum Coated

ALUMINUM PIPE

See Pipe, Aluminum

ALUMINUM SHEETS

See Sheets, Aluminum

ANALYZERS, CARBON DIOXIDE, PORTABLE

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Barclay, Inc., Robert, Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
●Dwyer Mfg. Co., F. W., Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
Engelhard, Inc., Chas., Newark, N. J.
General Power Plant Corp., New York, N. Y.
●Hays Corp., Michigan City, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Permutit Co., New York, N. Y.
Preferred Utilities Mfg. Corp., New York, N. Y.
Service to Industry, West Hartford, Conn.
Uehling Instrument Co., Paterson, N. J.
Will Corp., Rochester, N. Y.

ANEMOMETERS

Barclay, Inc., Robert, Chicago, Ill.
Dietzgen Co., Eugene, Chicago, Ill.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
G. M. Mfg. Co., New York, N. Y.
Hill, E. Vernon & Co., Chicago, Ill.
Illinois Testing Laboratories, Inc., Chicago, Ill.
●Taylor Instrument Companies, Rochester, N. Y.
Wallace & Tiernan Co., Inc., Newark, N. J.
Wilson Products, Inc., Reading, Pa.

ANGLE VALVES

See Valves, Angle

ANGLES, BARS, BEAMS, CHANNELS AND TEES (LIGHT WEIGHT SHAPES)

Allegheny Ludlum Steel Corp., Pittsburgh, Pa. (Stainless)
Aluminum Co. of America, Pittsburgh, Pa.
American Brass Co., Waterbury, Conn.
Atlantic Steel Co., Atlanta, Ga.
Bethlehem Steel Co., Bethlehem, Pa.
Byers Co., A. M., Pittsburgh, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
●Columbia Steel Co., United States Steel Corp., Subsidiary, San Francisco, Calif.
Decatur Iron & Steel Co., Decatur, Ala.
Dow Chemical Co., The, Midland, Mich.
Inland Steel Co., Chicago, Ill.
Inland Steel Products Co., Milwaukee, Wis.
International Steel Co., Evansville, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Laclede Steel Co., St. Louis, Mo.
Lees, John, Div., The, Serrick Corp., Muncie, Ind.
Mesker Steel Corp., Geo. L., Evansville, Ind.
Republic Steel Corp., Cleveland, O.
●Revere Copper and Brass, Incorporated, New York, N. Y.
Reynolds Metals Co., Louisville, Ky.
●Tennessee Coal, Iron & Railroad Co., United States Steel Corp. Subsidiary, Birmingham, Ala.
Truscon Steel Co., Youngstown, O.
●United States Steel Co., Pittsburgh, Pa.
Weirton Steel Co., Weirton, W. Va.
●Youngstown Sheet & Tube Co., Youngstown, O.

AQUASTATS

See Thermostats

ARC WELDERS

See Welders, Arc

ARC WELDING ELECTRODES

See Electrodes, Arc Welding

ASBESTOS FIBER AND CEMENT PIPE

See Pipe, Asbestos Fiber and Cement

ASBESTOS PACKING

See Packing, Asbestos

ASH CONVEYORS

See Conveyors, Coal and Ash

ATOMIZING NOZZLES

See Nozzles, Atomizing

AXIAL FLOW FANS

See Fans, Axial Flow, Pressure Type

BALANCING ELBOWS FOR HOT WATER HEATING SYSTEMS

See Elbows, Balancing, for Hot Water Heating Systems

BALANCING EQUIPMENT

See Equipment, Balancing

BALANCING VALVES

See Valves, Balancing

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BALL BEARINGS
See Bearings, Ball

BAROMETRIC CONTROLS
See Controls, Draft, Barometric

BASEBOARD RADIATION
See Radiation, Baseboard

BASES, MOTOR, TENSION ADJUSTING
Ackermann Mfg. Co., Wheeling, W. Va.
Alexander Bros., Philadelphia, Pa.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulley Co., Philadelphia, Pa.
Electrovent Fan & Mfg. Co., Chicago, Ill.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Rhoads & Sons, J. E., Philadelphia, Pa.
Rockwood Mfg. Co., Inc., Indianapolis, Ind.
Schnacke, Inc., Evansville, Ind.
Valley Foundry & Machine Works, Inc., Fresno, Calif.

BASES AND PADS, VIBRATION ISOLATING
●Buffalo Forge Co., Buffalo, N. Y.
Chicago Die Casting Mfg. Co., Chicago, Ill.
●Clarage Fan Co., Kalamazoo, Mich.
Cork Import Corp., Englewood, N. J.
Cork Insulation Co., Inc., New York, N. Y.
Fabreeka Products Co., Inc., Boston, Mass.
Felters Company, The, Boston, Mass.
Finn & Co., New York, N. Y.
Firestone Industrial Products, Akron, O.
Gates Rubber Co., Denver, Colo.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Hobsite Products Co., Paterson, N. J.
Johns-Manville, New York, N. Y.
Korfund Co., Inc., Long Island City, N. Y.
Lord Mfg. Co., Erie, Pa.
M B Mfg. Co., Inc., The, New Haven, Conn.
●Mundet Cork Corp., North Bergen, N. J.
National Lead Co., New York, N. Y.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Raybestos-Manhattan, Inc., Passaic, N. J.
Robinson Aviation, Inc., Teterboro, N. J.
Sponge Rubber Products Co., Shelton, Conn.
United Cork Companies, Kearny, N. J.
United States Rubber Co., New York, N. Y.
Vibration Eliminator Co., Long Island City, N. Y.
Western Felt Works, Chicago, Ill.

BEARINGS, BALL
Ahlberg Bearing Co., Chicago, Ill.
Bearings Co. of America, Lancaster, Pa.
●Dodge Mfg. Corp., Mishawaka, Ind.
Fafnir Bearing Co., New Britain, Conn.
Landis & Gyr Inc., New York, N. Y.
Link-Belt Co., Indianapolis, Ind.
Marlin-Rockwell Corp., Jamestown, N. Y.
New Departure Div., General Motors Corp., Bristol, Conn.
Nice Ball Bearing Co., Philadelphia, Pa.
Norma-Hoffman Bearings Corp., Stamford, Conn.
●SKF Industries, Inc., Philadelphia, Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
●Stephens-Adamson Mfg. Co., Aurora, Ill.
Thomson Industries, Inc., Manhasset, N. Y.
Torrington Co., The, Bantam Bearings Div., South Bend, Ind.
Wood's Sons Co., T. B., Chambersburg, Pa.

BEARINGS, NEEDLE
Roller Bearing Co. of America, Trenton, N. J.
Torrington Co., The, Bantam Bearings Div., South Bend, Ind.

BEARINGS, PILLOW BLOCK
Ahlberg Bearing Co., Chicago, Ill.
Anti-Friction Bearings Co., Los Angeles, Calif.
Caldwell Co., W. E., Louisville, Ky.
Central Die Casting & Mfg. Co., Inc., Chicago, Ill.
Chain Belt Co., Milwaukee, Wis.
Chicago Die Casting Mfg. Co., Chicago, Ill.
Clizbe Bros., Mfg. Co., Plymouth, Ind.
Congress Drives Div., Detroit, Mich.
Dick Co., Inc., R. & J., Passaic, N. J.
●Dodge Mfg. Corp., Mishawaka, Ind.
Fafnir Bearing Co., New Britain, Conn.
Freed Products Co., Moline, Ill.
Goldens' Foundry & Machine Co., Columbus, Ga.
Jeffrey Mfg. Co., Columbus, O.
Jones Foundry & Machine Co., W. A., Chicago, Ill.
Lau Blower Co., Dayton, O.
Link-Belt Co., Indianapolis, Ind.
Medart Co., St. Louis, Mo.
Moraine Products Div., General Motors Corp., Dayton, O.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Randall Graphite Bearings, Inc., Chicago, Ill.
Royersford Foundry & Machine Co., Inc., Royersford, Pa.
●SKF Industries, Inc., Philadelphia, Pa.
Shafer Bearing Corp., Downers Grove, Ill.
Sprout, Waldron & Co., Muncy, Pa.
Standard Pressed Steel Co., Jenkintown, Pa.
●Stephens-Adamson Mfg. Co., Aurora, Ill.
Torrington Co., The, Bantam Bearings Div., South Bend, Ind.
Triangle Mfg. Co., Oshkosh, Wis.
Whiteley Bearing Corp., Chicago, Ill.
Wood's Sons Co., T. B., Chambersburg, Pa.

BEARINGS, ROLLER
●Dodge Mfg. Corp., Mishawaka, Ind.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Link-Belt Co., Indianapolis, Ind.
Medart Co., St. Louis, Mo.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Roller Bearing Co. of America, Trenton, N. J.
Royersford Foundry & Machine Co, Inc., Royersford, Pa.
●SKF Industries, Inc., Philadelphia, Pa.
Shafer Bearing Corp., Downers Grove, Ill. (self aligning)
Timken Roller Bearing Co., Canton, O.
Torrington Co., The, Bantam Bearings Div., South Bend, Ind.
Wood's Sons Co., T. B., Chambersburg, Pa.

BEARINGS, SLEEVE
Cleveland Graphite Bronze Co., Cleveland, O.
●Dodge Mfg. Corp., Mishawaka, Ind.
Federal-Mogul Corp., Detroit, Mich.
Green Fuel Economizer Co., Beacon, N. Y.
International Powder Metallurgy, Inc., Ridgway, Pa.
Johnson Bronze Co., New Castle, Pa.
Keystone Carbon Co., Inc., St. Marys, Pa.
Medart Co., St. Louis, Mo.
Moraine Products Div., General Motors Corp., Dayton, O.
Morganite, Inc., Carbon Specialties Div., Long Island City, N. Y.
Randall Graphite Bearings, Inc., Chicago, Ill.
Whiteley Bearing Corp., Chicago, Ill.
Wood's Sons Co., T. B., Chambersburg, Pa.

BELLOWS, THERMOSTATIC AND METALLIC
●Bishop & Babcock Mfg. Co., Cleveland, O.
Bridgeport Thermostat Div., Robertshaw-Fulton Controls Co., Bridgeport, Conn.
Chicago Metal Hose Corp., Maywood, Ill.
Clifford Mfg. Co., of Standard-Thomson Corp., Waltham, Mass.
Cook Electric Co., Chicago, Ill.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
MagniLastic Div., Cook Electric Co., Chicago, Ill.
●Sterling, Inc., Milwaukee, Wis.
●Zallea Bros., Wilmington, Del.

BELTING, FLAT, LEATHER
Alexander Bros., Philadelphia, Pa.
Baldwin Belting, Inc., New York, N. Y.
Chicago Belting Co., Chicago, Ill.
Graton & Knight Co., Worcester, Mass.
Houghton & Co., E. F., Philadelphia, Pa.
Rhoads & Sons, J. E., Philadelphia, Pa.
Schieren Co., Chas. A., New York, N. Y.
Sikes Co., S. R., Minneapolis, Minn.
Williams & Son, I. B., Dover, N. H.

BELTING, FLAT, RUBBER
Boston Woven Hose & Rubber Co., Cambridge, Mass.
Dick Co., Inc., R. & J., Passaic, N. J.
Garlock Packing Co., Palmyra, N. Y.
Gates Rubber Co., The, Denver, Colo.
Gilmer Co., L. H., Div. of United States Rubber Co., Philadelphia, Pa.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Hamilton Rubber Mfg. Corp., Trenton, N. J.
Manheim Mfg. & Belting Co., Manheim, Pa.
Quaker Rubber Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Passaic, N. J.
Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, O.
Thermoid Co., Trenton, N. J.
United States Rubber Co., New York, N. Y.

BELTS, V
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
America Pulley Co., Philadelphia, Pa.
Baldwin Belting, Inc., New York, N. Y.
Boston Woven Hose & Rubber Co., Cambridge, Mass.
Browning Mfg. Co., Inc., Maysville, Ky.
Chicago Belting Co., Chicago, Ill.
Continental Rubber Wks., Erie, Pa.
Dayton Rubber Co., Dayton, O.
Dick Co., Inc., R. & J., Passaic, N. J.

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●Dodge Mfg. Corp., Mishawaka, Ind.
Gates Rubber Co., Denver, Colo.
Gilmer Co., L. H., Div. of United States Rubber Co., Philadelphia, Pa.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Jones Foundry & Machine Co., W. A., Chicago, Ill.
Manheim Mfg. & Belting Co., Manheim, Pa.
Maurey Mfg. Corp., Chicago, Ill.
Medart Co., St. Louis, Mo.
Pyott Foundry & Machine Co., Chicago, Ill.
Quaker Rubber Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Passaic, N. J.
Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, O.
Rhoads & Sons, J. E., Philadelphia, Pa.
Rockwood Mfg. Co., Inc., Indianapolis, Ind.
Schieren Co., Chas. A., New York, N. Y.
Thermoid Co., Trenton, N. J.
United States Rubber Co., New York, N. Y.
Wood's Sons Co., T. B., Chambersburg, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

BENDERS, PIPE

Air Reduction Sales Co., New York, N. Y.
American Pipe Bending Machine Co., Inc., Poultney, Vt.
American Pipe Tool Co., Chicago, Ill.
Blackhawk Mfg. Co., Milwaukee, Wis.
●Buffalo Forge Co., Buffalo, N. Y.
Crown Die & Tool Co., Chicago, Ill. (Hand)
●Greenlee Tool Co., Div. of Greenlee Bros. & Co., Rockford, Ill.
Holsclaw Bros., Inc., Evansville, Ind.
Hossfeld Mfg. Co., Winona, Minn.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Pacific Machine & Iron Wks., Tacoma, Wash.
Pedrick Tool & Machine Co., Philadelphia, Pa.
Pines Engineering Co., Inc., Aurora, Ill.
Radiant Devices, St. Louis, Mo.
Sac Tool Mfg. Co., St. Louis, Mo.
Tal Bender, Inc., Milwaukee, Wis.
Vanderman Mfg. Co., Willimantic, Conn.
Wallace Supplies Mfg. Co., Chicago, Ill.
Watson-Stillman Co., Roselle, N. J.

BENDERS, TUBING

Bernz Co., Otto, Rochester, N. Y.
Blackhawk Mfg. Co., Milwaukee, Wis.
●Buffalo Forge Co., Buffalo, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Duro Metal Products Co., Chicago, Ill.
Everhot Products Co., Chicago, Ill.
●Greenlee Tool Co., Div. of Greenlee Bros. & Co., Rockford, Ill.
Griffith Equipment Co., Inc., Los Angeles, Calif.
Holsclaw Bros., Inc., Evansville, Ind.
Hossfeld Mfg. Co., Winona, Minn.
Imperial Brass Mfg. Co., Chcago, Ill.
Keeney Mfg. Co., Newington, Conn.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Pacific Machine & Iron Wks., Tacoma, Wash.
Parker Appliance Co., The, Cleveland, O.
Pedrick Tool & Machine Co., Philadelphia, Pa.
Pines Engineering Co., Inc., Aurora, Ill.
Republic Steel Corp., Steel and Tubes Div., Cleveland, O.
Sac Tool Mfg. Co., St. Louis, Mo.
Steel City Electric Co., Pittsburgh, Pa.
Tal Bender, Inc., Milwaukee, Wis.
Wallace Supplies Mfg. Co., Chicago, Ill.

BENDS, EXPANSION, STEAM PIPE

American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Clow & Sons, James B., Chicago, Ill.
●Crane Co., Chicago, Ill.
●Dravo Corp., Machinery Div., Pittsburgh, Pa.
Ellsworth Pipe & Supply Co., Milwaukee, Wis.
Flori Pipe Co., The, St. Louis, Mo.
●Grinnell Co., Inc., Providence, R. I.
Harris & Co., Arthur, Chicago, Ill. (Stainless & non-ferrous)
Kellogg Co., M. W., The, New York, N. Y. (Corrugated steel)
Lumsden & Van Stone Co., Div. of Midwest Piping & Supply Co., South Boston, Mass.
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
Mitchell & Co., Inc., W. K., Philadelphia, Pa.
National Valve & Mfg. Co., Pittsburgh, Pa.
Ohio Pipe Bending & Machine Co., Cleveland, O.
Farks-Cramer Co., Fitchburg, Mass.
Pittsburgh Pipe Coil & Bending Co., Etna, Pa.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Power Piping Div., Blaw-Knox Co., Pittsburgh, Pa.
●Rempe Co., Chicago, Ill.
●Ric-wiL Co., Cleveland, O.
Roessing Mfg. Co., Pittsburgh, Pa.
Sales & Co., Murray W., Detroit, Mich.
Shaw Co., Benjamin F., Wilmington, Del.
Shaw-Kendall Engineering Co., Toledo, O.
U. S. Pipe & Mfg. Co., San Francisco, Calif.
●Walworth Co., New York, N. Y.
Western Piping & Engineering Co., San Francisco, Calif.
Whitlock Mfg. Co., Hartford, Conn.

BI-METALS, THERMOSTATIC

Baker & Co., Inc., Newark, N. J.
Chace Co., W. M., Detroit, Mich.
General Plate Div., Metals & Controls Corp., Attleboro, Mass.
Westinghouse Electric Corp., Pittsburgh, Pa.
Wilson Co., H. A., The, Newark, N. J.

BLADES, PROPELLER FAN

Ackermann Mfg. Co., Wheeling, W. Va.
Aerovent Fan Co., Inc., Piqua, O.
Aire-Foile Fan & Blower Co., Detroit, Mich.
Airmaster Corp., Chicago, Ill.
Alliance Mfg. Co., Alliance, O.
Beckett & Co., Inc., Thomas, Dallas, Tex.
Bronson Fan Mfg. Co., Los Angeles, Calif.
Burden Co., Alan E., Hollywood, Calif.
C & H Air Conditioning Fan Co., Inc., Atlanta, Ga.
Champion Blower & Forge Co., Lancaster, Pa.
Chelsea Fan & Blower Co., Inc., Plainfield, N. J.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
●DeBothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Dual-Air Fan Co., South Elgin, Ill.
Electrovent Fan & Mfg. Co., Chicago, Ill.
Goettl Bros. Metal Prod. Inc., Phoenix, Ariz.
International Engrg. Inc., Dayton, O.
●Joy Mfg. Co., Pittsburgh, Pa.
Martin Fan & Blower Co., Chicago, Ill.
Meier Electric & Machine Co., Inc., Indianapolis, Ind.
Motionair Co., Los Angeles, Calif.
Myers Electric Co., Inc., Pittsburgh, Pa.
Panelyte Div., St. Regis Paper Co., New York, N. Y.
Peerless Electric Co., Warren, O.
●Propellair Div., Robbins & Meyers Inc., Springfield, O.
Roto-Beam, Chicago, Ill.
Schwitzer-Cummins Co., Indianapolis, Ind.
Sensenich Corp., Lancaster, Pa.
●Scuth Bend Air Products, Inc., South Bend, Ind.
Standard Electric Mfg. Co., West Berlin, N. J.
Thermal Industries, Indio, Calif.
Torrington Mfg. Co., Torrington, Conn.
Torrington Mfg. Co., The, Western Div., Los Angeles, Calif.
Utility Appliance Corp., Los Angeles, Calif.
Wind-Way Fan & Ventilator Co., New Orleans, La.

BLAST GATES

See Gates, Blast

BLAST HEATERS

See Surface, Finned, Heating

BLAST HEATING COILS

See Surface, Finned, Heating

BLINDS, LINE, PIPE

Hamer Oil Tool Co., Long Beach, Calif.

BLOW PIPE FITTINGS

See Fittings, Blow Pipe

BLOWER FANS

See Fans, Axial Flow and Fans, Centrifugal

BLOWER HOUSINGS

See Housings, Fan

BLOWER WHEELS

See Wheels, Blower

BLOWERS, HIGH PRESSURE

For Low Pressure Blower Fans, See Fans, Centrifugal

●Aladdin Heating Corp., Oakland, Calif.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
●American Blower Corp., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Beach-Russ Co., New York, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
Carling Turbine Blower Co., Worcester, Mass.
Century Fan & Ventilator Co., Stamford, Conn.
Champion Blower & Forge Co., Lancaster, Pa.
Chicago Blower Corp., Chicago, Ill.
●Clarage Fan Co., Kalamazoo, Mich.
Day Co., The, Minneapolis, Minn.
De Laval Steam Turbine Co., Trenton, N. J.
Dynamic Air Engineering, Inc., Los Angeles, Calif.
Eastern Air Devices, Inc., Brooklyn, N. Y.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Electric Sprayit Co., The, Sheboygan, Wis.
●General Blower Co., Morton Grove, Ill.

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●Ingersoll-Rand Co., New York, N. Y.
Iron Fireman Mfg. Co., Cleveland, O.
●Joy Mfg., Pittsburgh, Pa.
Lammert & Mann Co., Chicago, Ill.
Lamson Corp., Blower Div., Syracuse, N. Y.
Mahr Mfg. Co. Div. of Diamond Iron Wks., Inc., Minneapolis, Minn.
Martin Fan & Blower Co., Chicago, Ill.
North American Mfg. Co., Cleveland, O.
Power Engineering Co., Chicago, Ill.
●Prat-Daniel Corp., East Port Chester, Conn.
Ripley Co., Inc., L-R Blower Div., Middletown, Conn.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., Hartford, Conn.
Standard Stoker Co., Inc.. Erie, Pa.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Wing Mfg. Co., L. J., Linden, N. J.

BLOWERS, SOOT

Bayer Co., St. Louis, Mo.
Diamond Power Specialty Corp., Lancaster, O.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Marion Machine Foundry & Supply Co., Marion, Ind.
Perfection Grate & Stoker Co., Springfield, Mass.

BLOW-OFF VALVES

See Valves, Blow-off

BLUE PRINT MACHINES

See Machines, Blue Print and White Print

BOARDS, PANEL AND CONTROL

Bristol Co., The, Waterbury, Conn.
●Marsh Corp., Jas. P., Skokie, Ill.
Taller & Cooper, Inc., Brooklyn, N. Y.

BOILER CLEANING COMPOUNDS

See Compounds, Boiler Cleaning

BOILER FEED PUMPS

See Pumps, Boiler Feed

BOILER FEEDERS

See Feeders, Water, Heating Boiler

BOILER GAGES

See Gages, Liquid Level

BOILER OBSERVATION PORTS

See Ports, Observation, Boiler

BOILER SEALING COMPOUNDS

See Compounds, Boiler and Radiator Sealing

BOILER AND TANK INSULATION

See Insulation, Boiler and Tank

BOILER TUBES

See Tubes, Boiler

BOILER WATER ALARMS

See Alarms, High and Low Boiler Water

BOILERS, HEATING, CAST IRON, SECTIONAL

2000 Sq Ft Steam Radiation and Over

●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Bastian-Morley Co., Inc., LaPorte. Ind.
●Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
Burnham Corp., Boiler Div., Irvington, N. Y.
Columbia Radiator Co., McKeesport, Pa.
●Crane Co., Chicago, Ill.
Dunkirk Radiator Corp., Dunkirk, N. Y.
International Heater Co., Utica, N. Y.
●Mueller Furnace Co., L. J., Milwaukee, Wis.
National Radiator Co., The, Johnstown, Pa.
Pennsylvania Furnace & Iron Co., Warren, Pa.
Prox Co., Inc., Frank, Terre Haute, Ind.
Richmond Radiator Co., New York, N. Y.
●Smith Co., Inc., H. B., The, Westfield, Mass.
Surface Combustion Corp., Toledo, O.
United States Radiator Corp., Detroit, Mich.
Weil-McLain Co., Michigan City, Ind.

BOILERS, HEATING, STEEL, FIRE TUBE

2000 Sq Ft Steam Radiation and Over

●Aldrich Co., The, Wyoming, Ill.
Alert Boiler & Mfg. Co., Detroit, Mich.
American Shipbuilding Co., Cleveland, O.
●Ames Iron Works, Div. of Pierce Butler Radiator Corp., Oswego, N. Y.
Atlantic Steel Boiler Co., Philadelphia, Pa.
Bigelow Co., New Haven, Conn.
Birchfield Boiler, Inc., Tacoma, Wash.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Brownell Co., The, Dayton, O.
Burnham Corp., Boiler Div., Irvington, N. Y.
Combustion Engineering-Superheater, Inc., New York, N. Y.
Dewey-Shepard Boiler Co., Indianapolis, Ind.
Dillon Steam Boiler Wks., Inc., D. M., Fitchburg, Mass.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
Erie City Iron Wks., Erie, Pa.
Farrar & Trefts, Buffalo, N. Y.
Federal Boiler Co., Inc., Midland Park, N. J.
●Fitzgibbons Boiler Co., Inc., New York, N. Y.
Frost Mfg. Co., Galesburg, Ill.
Hamburg Boiler Works, Inc., Hamburg, Pa.
Hodge Boiler Wks., East Boston, Mass.
International Engineering Wks., Inc., Framingham, Mass.
Johnston Bros., Inc., Ferrysburg, Mich.
●Kewanee Boiler Corp., Kewanee, Ill.
Leffel & Co., James, Springfield, O.
Lookout Boiler & Mfg. Co., Chattanooga. Tenn.
Manitowoc Engineering Wks., Manitowoc, Wis.
Mt. Hawley Mfg. Co., Inc., Peoria, Ill.
Murray Iron Wks. Co., Burlington, Ia.
National Radiator Co., The, Johnstown, Pa.
●Orr & Semblower, Inc., Reading, Pa.
Pacific Steel Boiler Div., United States Radiator Corp., Detroit, Mich.
Republic Boiler Corp., New York, N. Y.
Smith Twin Tubular Boiler Co., Inc., Philadelphia, Pa.
●Spencer Heater Div., Avco Mfg. Corp., Williamsport, Pa.
Stout & Sons, David, St. Louis, Mo.
●Terre Haute Boiler Works Co., Terre Haute, Ind.
Titusville Iron Wks. Co., The, Titusville, Pa.
Union Iron Wks., Erie, Pa.
Wickes Boiler Co., Saginaw, Mich.

BOILERS, HEATING, STEEL, WATER TUBE

Anetsberger Bros., Inc., Northbrook, Ill.
●Babcock & Wilcox Co., New York, N. Y.
Bigelow Co., The, New Haven, Conn.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
●Brown Products Co., Forest Hills, N. Y.
Bryan Steam Corp., Peru, Ind.
Central States Steel Boiler Co., Chicago, Ill.
Combustion Engineering-Superheater, Inc., New York, N. Y.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Crotty Mfg. Corp., Flushing, L. I., N. Y.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
Edge Moor Iron Wks., Inc., Edge Moor, Del.
Erie City Iron Wks., Erie, Pa.
Heilman Boiler Wks., Inc., Allentown, Pa.
International Boiler Wks. Co., The, East Stroudsburg, Pa.
International Engineering Wks., Inc., Framingham, Mass.
Keeler Co., E., Williamsport, Pa.
Morheat Corp., Lansing, Mich.
Murray Iron Wks., Co., Burlington, Ia.
Riley Stoker Corp., Worcester, Mass.
Springfield Boiler Co., Springfield, Ill.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
Super Mold Corp., Lodi, Calif.
Titusville Iron Works Co., The, Titusville, Pa.
Union Iron Works, Erie, Pa.
V. & E. Products, Inc., Schuylkill Haven, Pa.
Viking Mfg. Corp., Cleveland, O.
Vogt Machine Co., Henry, Louisville, Ky.
Waterfilm Boilers, Inc., Jersey City, N. J.
Wickes Boiler Co., Saginaw, Mich.
Will-Burt Co., The, Orrville, O.

BOILERS, PACKAGED STEAM GENERATING UNITS, HEATING AND PROCESS

●Ames Iron Works, Div. of Pierce Butler Radiator Corp., Oswego, N. Y.
Babcock & Wilcox Co., New York, N. Y.
Cla-Val Co., Alhambra, Calif.
●Cleaver-Brooks Co., Milwaukee, Wis.
Combustion Engineering-Superheater, Inc., New York, N. Y.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Consolidated Boiler Corp., Boston, Mass.
Custom Engineering Co., Los Angeles, Calif. (electric)
Cyclotherm Corp., Oswego, N. Y.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Edge Moor Iron Works, Inc., Edge Moor, Del.
Erie City Iron Works, Erie, Pa.
Foster Wheeler Corp., New York, N. Y.
Heilman Boiler Wks., Inc., Allentown, Pa.
Johnston Bros., Inc., Ferrysburg, Mich.
Keeler Co., E., Williamsport, Pa.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Livingstone Engineering Co., Worcester, Mass. (electric)

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Martin Co., Inc., J. O., San Francisco, Calif.
Mears-Kane-Ofeldt, Inc., Bridgeport, Pa.
●Orr & Sembower, Inc., Reading, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
●Sellers Engineering Co., Chicago, Ill.
Springfield Boiler Co., Springfield, Ill.
●Superior Combustion Industries, Inc., New York, N. Y.
Titusville Iron Works Co., The, Titusville, Pa.
Vapor Heating Corp., Chicago, Ill.
Wickes Boiler Co., Saginaw, Mich.
●York-Shipley, Inc., York, Pa.

BOLTS, EXPANSION

Chase Brass & Copper Co., Waterbury, Conn.
Chicago Expansion Bolt Co., Chicago, Ill.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
Industrial Screw Co., Chicago, Ill.
Kenney Co., L. C., Chicago, Ill.
National Lead Co., New York, N. Y.
Paine Co., Chicago, Ill.
Rawlplug Co., Inc., The, New York, N. Y.
Star Expansion Bolt Co., New York, N. Y.
U. S. Expansion Bolt Co., York, Pa.

BOLTS AND STUDS, FLANGE

Bethlehem Steel Co., Bethlehem, Pa.
Buffalo Bolt Co., North Tonawanda, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Clark Bros. Bolt Co., Milldale, Conn.
●Crane Co., Chicago, Ill.
Erie Bolt & Nut Co., Erie, Pa.
Harper Co., H. M., Morton Grove, Ill.
Haskell Mfg. Co., Wm. H., Pawtucket, R. I.
Industrial Screw Co., Chicago, Ill.
Lamson & Sessions Co., Cleveland, O.
Pheoll Mfg. Co., Chicago, Ill.
Republic Steel Corp., Bolt & Nut Div., Cleveland, O.
Rockford Screw Products Co., Rockford, Ill.
Russell, Purdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

BOLTS, TOGGLE AND ANCHOR

Carpenter & Paterson, Inc., East Boston, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Expansion Bolt Co., Chicago, Ill.
Crawford Co., Chicago, Ill.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
Industrial Screw Co., Chicago, Ill.
Moore, Inc., Goodloe E., Danville, Ill.
Paine Co., Chicago, Ill.
Rawlplug Co., Inc., The, New York, N. Y.
Star Expansion Bolt Co., New York, N. Y.
U. S. Expansion Bolt Co., York, Pa.

BOOTHS, PAINTING, SPRAY

●Binks Mfg. Co., Chicago, Ill.
Centri-Spray Corp., Detroit, Mich. (wet type)
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
DeVilbiss Co., The, Toledo, O.
Electric Sprayit Co., The, Sheboygan, Wis.
Goethel Sheet Metal Works, Alfred, Milwaukee, Wis.
Kirk & Blum Mfg. Co., Cincinnati, O.
Mahon Co., R. C., Detroit, Mich.
Newcomb-Detroit Co., Detroit, Mich.
Peters-Dalton, Inc., Detroit, Mich.
Plummer Spray Equipment Co., Napolean, O.
Schmieg Industries, Detroit, Mich.
Spray Engineering Co., Somerville, Mass.
Young & Bertke Co., Cincinnati, O.

BRAKES, SHEET METAL, HAND

Barth Mfg. Co., Milldale, Conn.
Dreis & Krump Mfg. Co., Chicago, Ill.
Eiker Mfg. Co., Ogallala, Neb.
Excelsior Tool & Machine Co., East St. Louis, Ill.
New Albany Machine Mfg. Co., New Albany, Ind.
Niagara Machine & Tool Works, Buffalo, N. Y.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Peck, Stow & Wilcox Co., Southington, Conn.
St. Louis Tool Co., St. Louis, Mo.
Webb Machine & Tool Co., Imperial, Pa.
Weiss & Co., H., New York, N. Y.
Whitney Metal Tool Co., Rockford, Ill.

BRAKES, SHEET METAL, PORTABLE

Barth Mfg. Co., Milldale, Conn.
Dreis & Krump Mfg. Co. Chicago, Ill.
Eiker Mfg. Co., Ogallala, Neb.
Harris, A. R., Hammond, Ind.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Webb Machine & Tool Co., Imperial, Pa.
Whitney Metal Tool Co., Rockford, Ill.

BRAKES, SHEET METAL, POWER

Bath Co., Cyril, The, Cleveland, O.
Cincinnati Shaper Co., Cincinnati, O.
Cleveland Tramrail Div., Cleveland Crane & Engineering Co., Wickliffe, O.
Dreis & Krump Mfg. Co., Chicago, Ill.
Heartley Machine & Tool Co., Toledo, O.
Munton Mfg. Co., Franklin Park, Ill.
Ohl & Co., Geo. A., Newark, N. J.
Peck, Stow & Wilcox Co., Southington, Conn.
Verson Allsteel Press Co., Chicago, Ill.
Verson Mfg. Co., The, Dallas, Tex.
Weiss & Co., H., New York, N. Y.
Whitney Metal Tool Co., Rockford, Ill.
Wilson Co., K. R., Buffalo, N. Y.

BRASS PIPE

See Pipe, Brass and Copper

BRASS TUBING

See Tubing, Brass and Copper

BRASS UNIONS

See Unions, Brass

BRASS VALVES

See Valves, Gate; and Valves, Globe

BRAZING TORCHES

See Torches, Brazing

BREAKERS, VACUUM (For Steam Using Equipment)

Bailey Co., Chas. M., San Francisco, Calif.
●Hoffman Specialty Co., Indianapolis, Ind.
McAlear Mfg. Co., Chicago, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Tallmadge Systems, Webster, Div., of Hoffman Specialty Co., Indianapolis, Ind.

BRONZE VALVES

See Valves, Gate; and Valves, Globe

BUILDING INSULATION

See Insulation, Building

BURNERS, GAS, COMMERCIAL AND INDUSTRIAL

Automatic Firing Corp., St. Louis, Mo.
Barber Gas Burner Co., Cleveland, O.
Barton Co., Minneapolis, Minn.
Beck Engineering Combustion Kompany, St. Louis, Mo.
Bryant Corp., C. L., Cleveland, O.
●Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
Central States Mfg. Co., Inc., Arkansas City, Kan.
Certified Furnace Co., Div. Stainless & Steel Products Co., St. Paul, Minn.
●Cleaver-Brooks Co., Milwaukee, Wis.
Coppus Engineering Corp., Worcester, Mass.
Dalzen Tool & Mfg. Co., Detroit, Mich.
●Eclipse Fuel Engrg. Co., Rockford, Ill.
Engineer Co., New York, N. Y.
●Enterprise Engine & Machinery Co., Div. of General Metals Corp., San Francisco, Calif.
Faber Engineering Co., Inc., Philadelphia, Pa.
Finn Engineers, Jerry, St. Paul, Minn.
Forney Engineering Co., Dallas, Tex.
Fuelgaurd Co., Dallas, Tex.
Gold Top Heating, Inc., Butte, Mont.
Gordon & Piatt, P. O. Box 331, Winfield, Kan.
Haney Gas Burner & Engineers, Monrovia, Calif.
Iron Fireman Mfg. Co., Cleveland, O.
●Jackson & Church Co., Saginaw, Mich.
Jamieson Mfg. Co., Dallas, Tex.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Kindl-Air Corp., Cleveland, O.
Leahy Mfg. Co., Los Angeles, Calif.
Lientz Co., B. P., Kansas City, Mo.
Mahr Mfg. Co., Div., of Diamond Iron Wks., Inc., Minneapolis, Minn.
Martin Co., Inc., J. O., San Francisco, Calif.
●Mettler Co., Inc., The, Los Angeles, Calif.
Mid-Continent Metal Products Co., Chicago, Ill.
National Airoil Burner Co., Inc., Philadelphia, Pa.
Newcomb-Detroit Co., Detroit, Mich.
Norman Products Co., Inc., Columbus, O.
North American Mfg. Co., Cleveland, O.
Peabody Engrg. Corp., New York, N. Y.
●Ray Oil Burner Co., San Francisco, Calif.
●Reinhard Brothers Co., Minneapolis, Minn.
Richmond Radiator Co., New York, N. Y.

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Roberts-Gordon Appliance Corp., Buffalo, N. Y.
Rotary Mfg. Co., Los Angeles, Calif.
Selas Corp. of America, Philadelphia, Pa.
●Sellers Engineering Co., Chicago, Ill.
Siemon & Co., Kansas City, Mo.
Souner Burner Co., Winfield, Kan.
Standard Fuel & Engineering Co., Detroit, Mich.
Staples & Pfeiffer, San Francisco, Calif.
Stout & Sons, David, St. Louis, Mo.
●Superior Combustion Industries, Inc., New York, N. Y.
Surface Combustion Corp., Toledo, O.
Todd Shipyards Corp., Combustion Equipment Div., Elmhurst, L. I., N. Y.
●Webster Engineering Co., Tulsa, Okla.
Will-Burt Co., Orrville, O.
●Zink Co., John, Tulsa, Okla.
Zurn Mfg. Co., J. A., Industrial Div., Erie, Pa.

BURNERS, GAS AND OIL COMBINED, COMMERCIAL AND INDUSTRIAL

Automatic Firing Corp., St. Louis, Mo.
●Babcock & Wilcox Co., New York, N. Y.
●Cleaver-Brooks Co., Milwaukee, Wis.
Coppus Engineering Corp., Worcester, Mass.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Engineer Co., New York, N. Y.
Enterprise Engine & Machinery Co., Div. of General Metals Corp., San Francisco, Calif.
Faber Engineering Co., Inc., Philadelphia, Pa.
Forney Engineering Co., Dallas, Tex.
Haney Gas Burner & Engineers, Monrovia, Calif.
Iron Fireman Mfg. Co., Cleveland, O.
Johnson Co., S. T., Philadelphia, Pa.
Lammert & Mann Co., Chicago, Ill.
Leahy Mfg. Co., Los Angeles, Calif.
Lientz Co., B. P., Kansas City, Mo.
Mahr Mfg. Co., Div. of Diamond Iron Wks., Inc., Minneapolis. Minn.
●Mettler Co., Inc., The, Los Angeles, Calif.
National Airoil Burner Co., Inc., Philadelphia, Pa.
Norman Products Co., Inc., Columbus, O.
North American Mfg. Co., Cleveland, O.
Peabody Engineering Corp., New York, N. Y.
Petroleum Heat & Power Co., Stamford, Conn.
Preferred Utilities Mfg. Corp., New York, N. Y.
●Ray Oil Burner Co., San Francisco, Calif.
Siemon & Co., Kansas City, Mo.
Simplex Oil Heating Corp., New York, N. Y.
Staples & Pfeiffer, San Francisco, Calif.
●Superior Combustion Industries, Inc., New York, N. Y.
Surface Combustion Corp., Toledo, O.
Todd Shipyards Corp., Combustion Equipment Div., Elmhurst, L. I., N. Y.
●Webster Engineering Co., Tulsa, Okla.
●Zink Co., John, Tulsa, Okla.

BURNERS, OIL, COMMERCIAL AND INDUSTRIAL

●Ace Engineering Co., Chicago, Ill. (Rotary)
Airtemp, Div. of Chrysler Corp., Dayton, O.
●Aldrich Co., The, Wyoming, Ill.
American Heat Corp., Lowell, Mass. (Steam atomizing)
Auburn Burner Co., Auburn, Ind.
Automatic Firing Corp., St. Louis, Mo.
●Babcock & Wilcox Co., New York, N. Y.
●Best Combustion Equipment Co., Inc., W. N., Carlstadt, N. J.
Caloroil Burner Corp., Hartford, Conn.
Catskill Metal Works, Inc., Catskill, N. Y.
●Century Engrg. Corp., Cedar Rapids, Ia.
Certified Furnace Co., Div. Stainless & Steel Products Co., St. Paul, Minn.
Chandler Co., Cedar Rapids, Ia.
●Cleaver-Brooks Co., Milwaukee, Wis.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.
Dalmo-Victor Co., San Carlos, Calif.
Delco Appliance Div., General Motors Corp., Rochester, N. Y.
Dewey-Shepard Boiler Co., Indianapolis, Ind. (high pressure)
Diesel Oil Burner Corp. of New York, Jamaica, Long Island, N. Y.
Drying Systems, Inc., Chicago, Ill.
Eckhart Mfg. Co., Inc., Union, N. J. (High pressure atomizing)
Electrol Burner Mfg. Co., Inc., Rutherford, N. J.
Engineering Co., New York, N. Y.
Enterprise Engine & Foundry Co., San Francisco, Calif.
Faber Engineering Co., Inc., Philadelphia, Pa.
Forney Engineering Co., Dallas, Tex. (both steam atomizing & mechanical, high pressure)
Fuel Savers, Inc., Harrisburg, Pa. (high pressure)
●General Automatic Products Corp., Baltimore, Md.
Gilbert & Barker Mfg. Co., West Springfield, Mass.
Hardinge Oil Burner & Mfg. Co., Chicago, Ill.
Harvey-Whipple, Inc., Springfield, Mass.
Holtum Mfg. Co., Freeport, Ill.
Iron Fireman Mfg. Co., Cleveland, O. (Rotary atomizing, high pressure atomizing)
●Jackson & Church Co., Saginaw, Mich.
Johnson Co., S. T., Philadelphia, Pa.
Kleen-Heet, Inc., Chicago, Ill.
Kol-Master Corp., Oregon, Ill. (high pressure)
Lammert & Mann Co., Chicago, Ill.
Lancaster Heat Transfer Co., Inc., Brooklyn, N. Y. (horizontal rotary-belt & direct drives)
Leahy Mfg. Co., Los Angeles, Calif.
Lieblich Oil Burner Inc., New York, N. Y.
Lientz Co., B. P., Kansas City, Mo. (steam atomizing)
Mahr Mfg. Co., Div. of Diamond Iron Wks., Inc., Minneapolis, Minn.
Malleable Iron Fittings Co., Branford, Conn. (High pressure atomizing)
●Mettler Co., Inc., The, Los Angeles, Calif. (high pressure atomizing and steam atomizing)
Montag Stove & Furnace Works, Portland, Ore.
Mt. Hawley Mfg. Co., Inc., Peoria, Ill.
National Airoil Burner Co., Inc., Philadelphia, Pa.
National Oil Burner Co. of N. Y. Inc., Brooklyn, N. Y. (Horizontal rotary)
North American Mfg. Co., Cleveland, O.
Nu-Way Corp., The, Rock Island, Ill.
Peabody Engrg. Corp., New York, N. Y.
Petroleum Heat & Power Co., Stamford, Conn.
Preferred Utilities Mfg. Corp., New York, N. Y.
Radiant Utilities Corp., Brooklyn, N. Y. (high pressure)
●Ray Oil Burner Co., San Francisco, Calif. (High pressure atomizing rotary)
Rayfield Co., C. L., Chicago, Ill. (Low pressure atomizing)
Reif-Rexoil, Inc., Buffalo, N. Y.
Riley Stoker Corp., Worcester, Mass.
Rotary Mfg. Co., Los Angeles, Calif.
Schutte & Koerting Co., Philadelphia, Pa.
Scott-Newcomb, Inc., St. Louis, Mo.
Simplex Oil Heating Corp., New York, N. Y. (Low and high pressure atomizing, and horizontal rotary types)
Staples & Pfeiffer, San Francisco, Calif. (High pressure and steam atomizing, variable capacity)
Sun-Ray Burner Mfg. Corp., Jamaica, N. Y.
●Superior Combustion Industries, Inc., New York, N. Y. (rotary)
Todd Shipyards Corp., Combustion Equipment Div., Elmhurst, L. I., N. Y. (Variable capacity, rotary, pressure atomizing, steam atomizing)
U. S. Machine Corp., Lebanon, Ind.
United States Radiator Corp., Detroit, Mich.
Vapofier Corp., Chicago, Ill. (Pre-mixed gaseous fuel generator)
●Webster Engineering Co., Tulsa, Okla.
Will-Burt Co., The, Orrville, O. (High pressure)
Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.
●York-Shipley, Inc., York, Pa. (Rotary, high pressure atomizing)
●Zink Co., John, Tulsa, Okla.

BURNERS, PULVERIZED COAL, COMMERCIAL AND INDUSTRIAL

●Babcock & Wilcox Co., New York, N. Y.
Combustion Engineering-Superheater, Inc., New York, N. Y.
Peabody Engineering Corp., New York, N. Y.
Riley Stoker Corp., Worcester, Mass.
Whiting Corp., Harvey, Ill.

BURNERS, PULVERIZED COAL AND GAS, COMBINED, COMMERCIAL AND INDUSTRIAL

●Babcock & Wilcox Co., New York, N. Y.
Combustion Engineering-Superheater, Inc., New York, N. Y.
●Foster Wheeler Corp., New York, N. Y.
Peabody Engineering Corp., New York, N. Y.
Riley Stoker Corp., Worcester, Mass.

BURNERS, PULVERIZED COAL AND OIL, COMBINED, COMMERCIAL AND INDUSTRIAL

●Babcock & Wilcox Co., New York, N. Y.
Blokolgas System, Inc., Detroit, Mich.
Combustion Engineering-Superheater, Inc., New York, N. Y.
Engineer Co., New York, N. Y.
Foster Wheeler Corp., New York, N. Y.
Riley Stoker Corp., Worcester, Mass.

CALCULATORS, AIR CONDITIONING, SLIDE RULE

●Calculator Specialties Co., Chicago, Ill.

CAPS, VENT FLUE

Accurate Sheet Metal Mfg. Works, Chicago, Ill.
Airjet Ventilator Co., Pasadena, Calif.
Breidert Co., G. C., Los Angeles, Calif.
General Ceramics & Steatite Corp., Keasbey, N. J. (acid proof)
Oil Equipment Mfg. Corp., New Haven, Conn.
Penn Ventilating Co., Philadelphia, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
●Wallace Co., William, Metalbestos Div., Belmont, Calif.

CARBON DIOXIDE ANALYZERS

See Analyzers, Carbon Dioxide, Portable

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CARBON DIOXIDE INDICATORS

See Indicators, Carbon Dioxide, Boiler Room

CARBON PIPE, TUBING, FITTINGS AND VALVES

See Pipe, Tubing, Fittings and Valves, Carbon and Graphite

CAST IRON PIPE

See Pipe, Cast Iron

CEMENT AND COMPOUNDS, PIPE JOINT

Acme Refining Co., The, Cleveland, O.
Acorn Refining Co., Cleveland, O.
Akron Metallic Gasket Co., Akron, O.
Arco Co., The, Cleveland, O.
Atlas Chemical Co., Marietta, O.
Babbitt Chemical Specialties Co., New York, N. Y.
Baer Bros., New York, N. Y.
Black Magic Products Co., Tulsa, Okla.
Blue Ridge Talc Co., Inc., Henry, Va.
Blue Seal Chemical Co., Roselle Park, N. J.
Bowser, Inc., Fort Wayne, Ind.
Cabot, Inc., Samuel, Boston, Mass.
Calbar Paint & Varnish Co., Philadelphia, Pa.
Chicago Specialty Mfg. Co., Chicago, Ill.
Colebrook & Sons, Inc., W. H., Syracuse, N. Y.
Continental Products Co., Euclid, O.
●Crane Co., Chicago, Ill.
Crane Packing Co., Chicago, Ill.
Croll & Son, Jesse G., Philadelphia, Pa.
Diamond Chemical Products, New York, N. Y.
Dixon Crucible Co., Joseph, Jersey City, N. J.
Felt Products Mfg. Co., Chicago, Ill.
Garlock Packing Co., Palmyra, N. Y.
Greene, Tweed & Co., North Wales, Pa.
●Grinnell Co., Inc., Providence, R. I.
Hercules Chemical Co., Inc., New York, N. Y.
Hetzel Roofing Products Co., Newark, N. J.
Highside Chemicals Co., Clifton, N. J.
Horn Co., Inc., A. C., Long Island City, N. Y.
Kenite Laboratory, Inc., Madison, N. J.
●Key Co., East St. Louis, Ill.
Keystone Asphalt Products Co., Chicago, Ill.
Krehbiel Co., J. H., Chicago, Ill.
Lake Chemical Co., Chicago, Ill.
Lastik Products Co., Inc., Pittsburgh, Pa.
Macksons Co., New York, N. Y.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
Milwaukee Gas Specialty Co., Milwaukee, Wis.
Montgomery Bros., San Francisco, Calif.
National Engineering Products, Inc., Washington, D. C
Nebel Mfg. Co., Cleveland, O.
Oil Equipment Mfg. Corp., New Haven, Conn.
Pecora Paint Co., Inc., Philadelphia, Pa.
Permatex Co., Inc., Brooklyn, N. Y.
Pyrolite Products Co., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Radiator Specialty Co., Charlotte, N. C.
Reilly Tar & Chemical Corp., Indianapolis, Ind.
Rutland Fire Clay Co., Rutland, Vt.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Sauereisen Cements Co., Pittsburgh, Pa.
Saverite Engineering Co., Hoboken, N. J.
Schundler & Co., F. E., Long Island City, N. Y.
Smooth-On Mfg. Co., Jersey City, N. J.
Star Products Co., New York, N. Y.
Sulflo, Inc., Elizabeth, N. J.
United States Stoneware Co., New York, N. Y.
Utility Laboratory, Inc., Brooklyn, N. Y.
Wilhelm Co., A., Reading, Pa.
X Laboratories, Inc., New York, N. Y.
X-Pando Corp., Long Island City, N. Y.

CEMENT, FURNACE

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Armstrong Co., Detroit, Mich.
●Armstrong Cork Co., Lancaster, Pa.
Botfield Refractories Co., Philadelphia, Pa.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Chicago Fire Brick Co., Chicago, Ill.
Chicago Specialty Mfg. Co., Chicago, Ill.
Clinton Metallic Paint Co., Clinton, N. Y. (Asbestos)
Continental Products Co., Euclid, O.
Fireline Stove & Furnace Lining Co., Chicago, Ill.
Grant Wilson, Inc., Chicago, Ill.
Foster Co., Benjamin, Philadelphia, Pa.
●Grant Wilson, Inc., Chicago 4, Ill.
Green Fire Brick Co., Mexico, Mo.
Hercules Chemical Co., Inc., New York, N. Y.
Johns-Manville, New York, N. Y.
Krehbiel Co., J. H., Chicago, Ill.
Laclede-Christy Co., St. Louis, Mo.
Lastik Products Co., Inc., Pittsbrugh, Pa.
McLeod & Henry Co., Inc., Troy, N. Y.
Nebel Mfg. Co., Cleveland, O.
Pecora Paint Co., Inc., Philadelphia, Pa.
Plastic Products Co., Detroit, Mich.
Presstite Engineering Co., St. Louis, Mo.
Pyrolite Products Co., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Ramtite Co., The, Chicago, Ill.
Refractory & Insulation Corp., New York, N. Y.
Rutland Fire Clay Co., Rutland, Vt.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Sall Mountain Co., Chicago, Ill.
Sauereisen Cements Co., Pittsburgh, Pa.
Standard Asbestos Mfg. Co., Chicago, Ill.
Standard Fuel Engineering Co., Detroit, Mich.
Tamms Industries, Inc., Chicago, Ill.
Taylor Sons Co., Charles, Cincinnati, O.
United States Stoneware Co., New York, N. Y.
Utility Laboratory, Inc., Brooklyn, N. Y.
Walsh Refractories Corp., St. Louis, Mo.

CEMENT, INSULATING

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Alton Mineral Wool Insulation Co., St. Louis, Mo.
●Armstrong Cork Co., Lancaster, Pa.
Baldwin-Hill Co., Trenton, N. J. (mineral wool)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Bigelow-Liptak Corp., Detroit, Mich.
Bird-Archer Co., Philadelphia, Pa.
Botfield Refractories Co., Philadelphia, Pa.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Carney Co., Inc., The, Mankato, Minn.
Chicago Fire Brick Co., Chicago, Ill.
Colebrook & Sons, Inc., W. H., Syracuse, N. Y.
Eagle-Picher Co., Cincinnati, O.
●Grant Wilson, Inc., Chicago, Ill.
Green Fire Brick Co., Mexico, Mo.
International Vermiculite Co., Girard, Ill.
Johns-Manville, New York, N. Y.
Keasbey Co., Robert A., New York, N. Y.
●Keasbey & Mattison Co., Ambler, Pa. (85 per cent magnesia)
Krehbiel Co., J. H., Chicago, Ill. (Asbestos, mineral wool)
Laclede-Christy Co., St. Louis, Mo.
Moore, Inc., Goodloe E., Danville, Ill.
Mundet Cork Corp., North Bergen, N. J.
Munn and Steele, Inc., South Boston, Mass.
National Engineering Products, Inc., Washington, D. C.
National Gypsum Co., Buffalo, N. Y.
Nelson Mfg. Co., B. F., Minneapolis, Minn.
Norristown Magnesia & Asbestos Co., Norristown, Pa.
●Owens-Corning Fiberglas Corp., Toledo, O.
Pabco Products Inc., San Francisco, Calif.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Peterson Co., B. A., Dowagiac, Mich.
Plibrico Jointless Firebrick Co., Chicago, Ill.
Poe Co., C. W., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Ramtite Co., The, Chicago, Ill.
Refractory & Insulation Corp., New York, N. Y.
Rex Clay Products Co., Detroit, Mich.
Rock Fleece Co., El Paso, Tex.
Ruberoid Co., New York, N. Y.
Rutland Fire Clay Co., Rutland, Vt.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Sall Mountain Co., Chicago, Ill.
Sauereisen Cements Co., Pittsburgh, Pa.
Schundler & Co., Inc., F. E., Long Island City, N. Y.
Smith & Kanzler Corp., Linden, N. J.
Standard Asbestos Mfg. Co., Chicago, Ill.
Standard Fuel Engineering Co., Detroit, Mich.
●Union Asbestos & Rubber Co., Cicero, Ill.
United States Mineral Wool Co., South Milwaukee, Wis.
Zonolite Co., Chicago, Ill.

CENTRIFUGAL PUMPS

See Pumps, Centrifugal

CHAIN DRIVES

See Drives, Chain

CHAMBERS, COMBUSTION, PREFORMED

●Armstrong Cork Co., Lancaster, Pa.
Barclay, Inc., Robert, Chicago, Ill.
Green Fire Brick Co., Mexico, Mo.
McLeod & Henry Co., Inc., Troy, N. Y.
Monogram Products Co., Inc., Philadelphia, Pa.
Oil Equipment Mfg. Corp., New Haven, Conn.
Peterson Co., B. A., Dowagiac, Mich.
Preferred Utilities Mfg. Corp., New York, N. Y.
Refractory & Insulation Corp., New York, N. Y.
Rex Clay Products Co., Detroit, Mich.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Stuart Co., W. W., Des Moines, Ia.
Walsh Refractories Corp., St. Louis, Mo.
●Zonolite Co., Chicago, Ill.

CHAMBERS, TEST, CONTROLLED TEMPERATURE AND HUMIDITY

Tenney Engineering, Inc., Newark, N. J.
York Corp., York, Pa.

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CHANGERS, SPEED, HYDRAULIC COUPLING

●American Blower Corp., Detroit, Mich.
CraneVeyor Corp., Los Angeles, Calif.
Greer Hydraulics, Inc., Brooklyn, N. Y.
Link-Belt Co., Philadelphia, Pa.
Reuland Electric Co., Alhambra, Calif. (combined electric motor and fluid drive coupling)
Twin Disc Clutch Co., Rockford, Ill.

CHANGERS, SPEED, MAGNETIC

Electric Machinery Mfg. Co., Minneapolis, Minn.
Reliance Electric & Engineering Co., Cleveland, O.

CHANGERS, SPEED, MECHANICAL

Abart Gear & Machine Co., Chicago, Ill.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Doall Co., The, Des Plaines, Ill.
Driv-Way Lite Co., Denver, Colo.
Gates Rubber Co., The, Denver, Colo.
Graham Transmissions, Inc., Milwaukee, Wis.
Greer Hydraulics, Inc., Brooklyn, N. Y.
Lewellen Mfg. Co., Columbus, Ind.
Lima Electric Motor Co., The, Lima, O.
Link-Belt Co., Philadelphia, Pa.
Lovejoy Flexible Coupling Co., Chicago, Ill.
Master Electric Co., Dayton, O.
Reeves Pulley Co., Columbus, Ind.
Salsbury Motors, Inc., Div., Wayne Mfg. Co., Pomona, Calif.
Speed Selector Inc., Cleveland, O.
Standard Transmission Equipment Co., Pasadena, Calif.
Steam Turbine Div., Worthington Pump & Machinery Corp., Wellsville, N. Y.
●Stephens-Adamson Mfg. Co., Aurora, Ill.
Sterling Electric Motors, Inc., Los Angeles, Calif.
U. S. Electrical Motors, Inc., Los Angeles, Calif.
Webster Electric Co., Racine, Wis.
White Mfg. Co., St. Paul, Minn.
Worthington Pump & Machinery Corp., Harrison, N. J.

CHECK VALVES

See Valves, Check

CHILLERS, WATER, FOR AIR CONDITIONING AND REFRIGERATION

●Acme Industries, Inc., Jackson, Mich.
Armstrong Co., Richard M., Westchester, Pa.
Baker Refrigeration Corp., South Windham, Me.
●Bell & Gossett Co., Morton Grove, Ill.
Brown Fintube Co., The, Elyria, O.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Dahlquist Mfg. Co. Inc., Div. of Process Engineering, Inc., Somerville, Mass.
●Davis Engineering Corp., Elizabeth, N. J.
Dole Refrigerating Co., Chicago, Ill.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Drayer & Hanson, Inc., Los Angeles, Calif.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
●Frick Co., Waynesboro, Pa.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Graham Mfg. Co., Inc., New York, N. Y.
Griscom-Russell Co., The, New York, N. Y.
Halstead & Mitchell, Pittsburgh, Pa.
Heat-X-Changer Co., Inc., The, New York, N. Y.
Howe Ice Machine Co., Chicago, Ill.
Larkin Coils, Inc., Atlanta, Ga.
McQuay, Inc., Minneapolis, Minn.
●Niagara Blower Co., New York, N. Y.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Peerless of America, Inc., Chicago, Ill.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa.
Refrigeration Economics Co., Inc., Canton, O.
Richmond Engineering Co., Inc., Richmond, Va.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
Temprite Products Corp., Birmingham, Mich.
●Trane Co., The, LaCrosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
Vilter Mfg. Co., The, Milwaukee, Wis.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Whitlock Mfg. Co., Hartford, Conn.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

CIRCULATORS FOR HOT WATER HEATING SYSTEMS

Alliance Industries, Huntingden Valley, Pa.
American-Marsh Pumps, Inc., Battle Creek, Mich.
●Bell & Gossett Co., Morton Grove, Ill.
Columbus Steam Pump Works Co., Columbus, O.
Davidson Co., M. T., Brooklyn, N. Y.
Fairbanks, Morse & Co., Chicago, Ill.
Kainer & Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
Kraissl Co., Inc., The, Hackensack, N. J.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Quality Specialty Co., Inc., Philadelphia, Pa.
Standard Electric Mfg. Co., West Berlin, N. J.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, LaCrosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
●Weil Pump Co., Chicago, Ill.
White Flomatic Corp., Hoosick Falls, N. Y.

CLAMPS, BEAM, PIPE HANGING

Carpenter & Paterson, Inc., East Boston, Mass.
Chicago Nipple Mfg. Co., Cicero, Ill.
Crawford Co., Chicago, Ill.
Farley Sleeve & Hanger Co., Cleveland, O.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
●Frick Co., Waynesboro, Pa.
Genspring, Inc., New York, N. Y.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Providence, R. I.
Hupp Corp., Globe Stamping Div., Cleveland, O.
Moore, Inc., Goodloe E., Danville, Ill.
National Valve & Mfg. Co., Pittsburgh, Pa.
Paine Co., Chicago, Ill.
Rockwood Sprinkler Co., Worcester, Mass.
Unistrut Products Co., Chicago, Ill.
●Walworth Co., New York, N. Y.

CLAMPS, HOSE

Actus Corp., Mount Vernon, N. Y.
Everhot Products Co., Chicago, Ill.
Flexible Tubing Corp., Branford, Conn.
Marman Products Co., Inc., Inglewood, Calif.
Scovill Mfg. Co., Brass Goods Div., Waterville, Conn.
Tinnerman Products, Inc., Cleveland, O.

CLAMPS, PIPE REPAIR

Altens Foundry & Machine Works, Inc., Lancaster, O.
Chelsea Metal Stamping Co., New York, N. Y.
Chicago Specialty Mfg. Co., Chicago, Ill.
Clow & Sons, James B., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Inner-Tite Div. of Yara Engineering Corp., Elizabeth, N. J.
Jarecki Valve Div., of H. K. Porter Co., Inc., Tulsa, Okla.
Marman Products Co., Inc., Inglewood, Calif.
Morris Coupling & Clamp Co., Ellwood City, Pa.
Rensselaer Valve Co., Cohoes, N. Y.
Ritter Pattern & Casting Co., Inc., New York, N. Y.
Skinner Co., M. B., South Bend, Ind.
Smooth-On Mfg. Co., Jersey City, N. J.
●Yarnall-Waring Co., Philadelphia, Pa.

CLAMPS, PIPE, WELDING

Adjustable Clamp Co., Chicago, Ill.
Detroit Stamping Co., Detroit, Mich.
Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
Jewel Mfg. Co., St. Paul, Minn.
Trindl Products, Ltd., Chicago, Ill.
Williams & Co., J. H., Buffalo, N. Y.

CLEANERS, AIR, ELECTRICAL

Air-Maze Corp., Cleveland, O.
●American Air Filter Co., Inc., Louisville, Ky.
Bartlett Hayward, Div. of Koppers Co., Baltimore, Md.
Lennox Furnace Co., Marshalltown, Ia., Syracuse, N. Y. & Columbus, O.
Raytheon Mfg. Co., Commercial Products Div., Waltham, Mass.
Thermix Corp., The, Greenwich, Conn.
Trion, Inc., McKees Rocks, Pa.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

CLEANERS, TUBE

●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Elliott Co., Jeannette, Pa.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Osborn Mfg. Co., Cleveland, O.
Perfection Grate & Stoker Co., Springfield, Mass.
Pierce Co., Wm. B., The, Buffalo, N. Y.
Pilley Brush Co., Fort Madison, Ia.
Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Spencer Turbine Co., Hartford, Conn.
Wilson, Inc., Thomas C., Long Island City, N. Y.
York Corp., York, Pa.

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CLEANERS, VACUUM, FOR BOILERS

Doyle Vacuum Cleaner Co., Grand Rapids, Mich.
Ideal Industries, Inc., Sycamore, Ill.
Lamson Corp., Blower Div., Syracuse, N. Y.
Spencer Turbine Co., Hartford, Conn.

CLEANING COMPOUNDS

See Compounds, Cleaning, Pipe Coil and Condenser

CLEANING COMPOUNDS, AIR FILTER

See Compounds, Cleaning, Air Filter

CLEANING MACHINES, PIPE

See Machines, Pipe Cleaning

COAL BURNERS

See Burners, Pulverized Coal; Stokers

COAL CONVEYORS

See Conveyors, Coal and Ash

COATINGS, PROTECTIVE, FOR METALS

Alrose Chemical Co., Providence, R. I.
Amercoat Div., American Pipe & Construction Co., South Gate, Calif.
American Chemical Paint Co., Ambler, Pa. (rust proofing chemicals)
American Hard Rubber Co., New York, N. Y. (hard & soft rubber)
American Solder & Flux Co., Philadelphia, Pa. (Galvanizing powder)
●Armstrong Cork Co., Lancaster, Pa. (asphalt for weather & low temperatures)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y. (Pitchbase)
Bart Mfg. Co., Inc., Belleville, N. J.
Blue Ridge Talc Co., Inc., Henry, Va.
Bonafide Genasco, Inc., New York, N. Y. (asphalt)
Brooklyn Varnish Mfg. Co., Brooklyn, N. Y.
Cabot Inc., Samuel, Boston, Mass. (Bituminuous black paint)
Carey Mfg. Co., Philip, The, Lockland, Cincinnati, O. (Asphalt and aluminum paints)
Colonial Alloys Co., Metals Div., Philadelphia, Pa. (anodizing chemical oxidizing for aluminum)
●Condenser Service & Engineering Co., Inc., Hoboken, N. J. (Metal spray)
Cordo Chemical Co., Norwalk, Conn.
Dampney Co. of America, Boston, Mass.
Dearborn Chemical Co., Chicago, Ill. (Rust preventive)
Debevoise Co., The, Brooklyn, N. Y.
Dow Corning Corp., Midland, Mich.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa. (corrosion shields for pipe joints)
du Pont de Nemours & Co. (Inc.), E. I., Fabrics & Finishes Dept., Wilmington, Del.
Eagle-Picher Co., Cincinnati, O. (Waterproof insulating, red lead and blue lead)
Flintkote Co., The, New York, N. Y. (Asphalt emulsions)
Foster Co., Benjamin, Philadelphia, Pa.
Galv-Weld Products, Lima, O. (Regalvanizing)
Gates Engineering Co., Wilmington, Del.
Goodrich Co., B. F., Akron, O.
Haering & Co., Inc., D. W., San Antonio, Texas. (Drying and nondrying)
Hague & Co., Alfred, Brooklyn, N. Y.
Hardy, Inc., Charles, New York, N. Y. (18-8 stainless steel paste)
Heresite & Chemical Co., Manitowoc, Wis. (Synthetic)
Houghton & Co., E. F., Philadelphia, Pa.
Industrial Metal Protectives, Inc., Dayton, O.
Interchemical Corp., Finishes Div., Newark, N. J.
Johnson Mfg. Co., Inc., Mt. Vernon, Ia.
Kellogg Co., M. W., The, New York, N. Y. (Heat resisting)
Knight, Maurice A., Akron, O. (Vinyl plastic base)
Koppers Co., Inc., Pittsburgh, Pa. (coal tar)
Lastik Products Co., Inc., Pittsburgh, Pa.
Lithgow Corp., Chicago, Ill.
Maas & Waldstein Co., Newark, N. J.
Midland Paint & Varnish Co., Cleveland, O.
●Miracle Adhesives, Corp., New York, N. Y.
Monsanto Chemical Co., Merrimac Div., Boston, Mass. (synthetics)
Mortell Co., J. W., Kankakee, Ill. (Asphalt)
National Lead Co., New York, N. Y. (Red lead)
National Pipe Coatings, Inc., Los Angeles, Calif.
Nebel Mfg. Co., Cleveland, O.
Nelson Mfg. Co., B. F., Minneapolis, Minn.
Nooter Corp., St. Louis, Mo. (Metal spray, lead burning alloy sheet)
Oakite Products, Inc., New York, N. Y.
Ohmlac Paint & Refining Co., Inc., New York, N. Y. (Acid resistant, heat resistant)
Penn Galvanizing Co., Philadelphia, Pa. (Galvanizing)
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Perolin Co., Inc., Chicago, Ill.
Pittsburgh Plate Glass Co., Pittsburgh, Pa. (Paint, varnish, lacquer)
Presstite Engineering Co., St. Louis, Mo.
Pyrolite Products Co., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Reilly Tar & Chemical Corp., Indianapolis, Ind. (Coal tar base)
●Ric-wiL Co., Cleveland, O.
Robertson Co., H. H., Pittsburgh, Pa.
Rust-Oleum Corp., Evanston, Ill.
Saverite Engineering Co., Hoboken, N. J. (Tank coatings, rust preventive)
Sonneborn Sons, Inc., L., New York, N. Y.
Southport Paint Co., Div. Wesson Oil & Snowdrift Co., Inc., Savannah, Ga. (Metallic paint)
Special Chemicals Corp., New York, N. Y. (Aluminum paint)
Stewart-Warner Corp., Heating Div., Indianapolis, Ind. (ceramic)
Tropical Paint & Oil Co., Cleveland, O.
Turco Products, Inc., Los Angeles, Calif.
United Chromium, Inc., New York, N. Y. (Chemical resisting organic coating)
United States Stoneware Co., New York, N. Y. (Corrosion resistant)
Watson-Standard Co., Pittsburgh, Pa.
Wilbur & Williams Co., Boston, Mass.
Wilhelm Co., A., Reading, Pa.
Wolfe-Kote Co., Inc., Sheboygan, Wis.
X-Pando Corp., Long Island City, N. Y. (Anti-corrosive)

COCKS, BOILER GAGE

Bordo Co., Inc., L. J., Glenside, Pa.
●Crane Co., Chicago, Ill.
Detroit Brass & Malleable Works, Detroit, Mich.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Keckley Co., O. C., Chicago, Ill.
Klingerit, Inc., New York, N. Y.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
●Marsh Corp., Jas P., Skokie, Ill.
Penberthy Injector Co., Detroit, Mich.
Powell Co., Wm., The, Cincinnati, O.
Reliance Gauge Column Co., Cleveland, O.
Swift Lubricator Co., Elmira, N. Y.
Williams Gauge Co., The, Pittsburgh, Pa.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.
Wright-Austin Co., Detroit, Mich.

COILS

See Surface, Cooling; Surface, Heating

COILS, CONDENSATION

●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
General Fittings Co., Providence, R. I.
Lewis & Co., Joseph E., Baltimore, Md.
Parker Appliance Co., The, Cleveland, O.
Yula Water Heaters, Inc., New York, N. Y.

COILS, FOR HOT WATER STORAGE TANKS

Adams Co., The, Dubuque, Ia.
American Cooling Tower Co., Kansas City, Mo.
●American District Steam Co., North Tonawanda, N. Y.
●Bell & Gossett Co., Morton Grove, Ill.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Davis Engineering Corp., Elizabeth, N. J.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Everhot Products Co., Chicago, Ill.
General Fittings Co., Providence, R. I.
General Heaters & Regulators Co., Chicago, Ill.
Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
Kold-Hold Mfg. Co., Lansing, Mich.
National Pipe Bending Co., New Haven, Conn.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Pedrick Tool & Machine Co., Philadelphia, Pa.
Pittsburgh Pipe Coil & Bending Co., Etna, Pa.
Quaker City Iron Wks., Philadelphia, Pa.
Roessing Mfg. Co., Pittsburgh, Pa.
Sales & Co., Murray W., Detroit, Mich.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
●Taco Heaters, Inc., Providence, R. I.
U. S. Pipe & Mfg. Co., San Francisco, Calif.
Whitlock Mfg. Co., Hartford, Conn.
Yula Water Heaters, Inc., New York, N. Y.

COILS AND PANELS, RADIANT HEATING, PREFABRICATED

Atlantic Pipebending & Fabricating Corp., Edgewater, N. J.
Bradfield, Jos. L., Indianapolis, Ind. (headers)
Cannelton Sewer Pipe Co., RadianTile Div., Chicago, Ill. (Vitrified clay floor blocks and ducts for warm air)
Capitol Mfg. & Supply Co., Columbus, O.
Clow & Sons, James B., Chicago, Ill.
Cobra Pipe & Coil Co., Inc., Elmwood, Conn.
Crittall Radiant Heating, Inc., Richard, New York, N. Y.
Even-Ray Co., Inc., Newark, N. J.
●Kritzer Radiant Coils, Inc., Chicago, Ill.
Meco, Inc., Portland, Ore.
Pan-L-Heat Corp., Portland, Ore.
Pedrick Tool & Machine Co., Philadelphia, Pa.
Radiant Heat Engineering, Inc., Pasadena, Calif.
Radiant Heat Sales Engrg. Co., Gary, Ind.
Simplex Ceiling Corp., New York, N. Y.

● Advertisement in this issue. See Index to Advertisers, page 127d

T & H Engineering Co., Little Ferry, N. J. (hammer and holding rig for installing ceiling heating coils)

COILS, PIPE

●Acme Industries, Inc., Jackson, Mich.
American Cooling Towers Co., Kansas City, Mo.
Atlantic Pipebending & Fabricating Corp., Edgewater, N. J.
B & M Mfg. Co., East Orange, N. J.
Baker Refrigeration Corp., South Windham, Me.
Ball Welding Works, Inc., Oakland, Calif.
Biggs Boiler Wks., Co., The, E. Akron, O.
Capitol Mfg. & Supply Co., Columbus, O.
Chicago Nipple Mfg. Co., Cicero, Ill.
Clow & Sons, James B., Chicago, Ill.
Cobra Pipe & Coil Co., Inc., Elmwood, Conn.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Crane Co., Chicago, Ill.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Ellsworth Pipe & Supply Co., Milwaukee, Wis.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y. (lead, lead covered, and lead alloy)
Flori Pipe Co., The, St. Louis, Mo.
●Frick Co., Waynesboro, Pa.
Harris & Co., Arthur, Chicago, Ill.
Kold-Hold Mfg. Co., Lansing, Mich.
Kopperman & Sons, Joseph, Philadelphia, Pa.
Lewis & Co., Joseph E., Baltimore, Md.
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
Mitchell & Co., Inc., W. K., Philadelphia, Pa.
●Mueller Brass Co., Port Huron, Mich.
National Pipe Bending Co., New Haven, Conn.
Ohio Pipe Bending & Machine Co., Cleveland, O.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Pedrick Tool & Machine Co., Philadelphia, Pa.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Pittsburgh Pipe Coil & Bending Co., Etna, Pa.
Radiant Heat Engineering, Inc., Pasadena, Calif.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa.
Refrigeration Appliances, Inc., Chicago, Ill.
●Rempe Co., Chicago, Ill.
Reynolds Mfg. Co., Inc., Springfield, Mo.
Roessing Mfg. Co., Pittsburgh, Pa.
Sales & Co., Murray W., Detroit, Mich.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
Shaw-Kendall Engineering Co., Toledo, O.
U. S. Pipe & Mfg. Co., San Francisco, Calif.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Vilter Mfg. Co., The, Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
Whitlock Mfg. Co., Hartford, Conn.

COLLECTION, DUST AND FUME, ULTRASONIC

Supersonics Corp. of America, New York, N. Y.
Ultrasonic Corp., Cambridge, Mass.

COLLECTORS, DUST

Aerotec Corp., The, Greenwich, Conn.
Aget-Detroit Co., Ann Arbor, Mich.
Allington & Curtis Mfg. Co., Saginaw, Mich. (centrifugal & bag)
●American Air Filter Co., Inc., Louisville, Ky.
●American Blower Corp., Detroit, Mich.
American Wheelabrator & Equiment Corp., Mishawaka, Ind.
Blower Application Co., Milwaukee, Wis.
Bubar Dust Systems, Inc., Old Lyme, Conn. (mechanical)
●Buffalo Forge Co., Buffalo, N. Y. (wet & dry)
Carolina Blower Co., Inc., Greensboro, N. C.
Centri-Spray Corp., Detroit, Mich. (Wet type)
Chicago Blower Corp., Chicago, Ill. (centrifugal)
Cincinnati Electrical Tool Co., The, Cincinnati, O. (self contained)
Clark Dust Control Co., Chicago, Ill.
Columbian Steel Tank Co., Kansas City, Mo.
Day Co., The, Minneapolis, Minn.
Diamond Power Specialty Corp., Lancaster, O.
Doall Co., The, Des Plaines, Ill.
Ducon Co., Mineola, N. Y.
Dust Filter Co., Chicago, Ill.
Dust Suppression & Engineering Co., Lake Orion, Mich.
Goethel Sheet Metal Wks., Alfred, Milwaukee, Wis.
Griffin & Co., Inc., Louisville, Ky.
Ideal Industries, Inc., Sycamore, Ill.
Indiana Fan Company, Indianapolis, Ind.
Jacobs Co., B. & J., Cincinnati, O.
Kirk & Blum Mfg. Co., Cincinnati, O.
Kluegel & Co., E., St. Paul, Minn.
Lamson Corp., Blower Div., Syracuse, N. Y.
Lumm Co., A. H., Toledo, O.
Mahon Co., R. C., Detroit, Mich. (dry inertia, air washers, fog filters)
Newcomb-Detroit Co., Detroit, Mich. (recirculating water type)
Northern Blower Co., Cleveland, O.
Pangborn Corp., Hagerstown, Md. (cloth filter)
Peters-Dalton, Inc., Detroit, Mich.
●Prat-Daniel Corp., East Port Chester, Conn.
Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
Research Corp., New York, N. Y.
Ruemelin Mfg. Co., Milwaukee, Wis.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Schmieg Industries, Detroit, Mich.
Schneible Co., Claude B., Detroit, Mich.
Sly Mfg. Co., W. W., Cleveland, O.
Spencer Turbine Co., Hartford, Conn.
Sprout-Waldron & Co., Muncy, Pa.
Thermix Corp., The, Greenwich, Conn.
Torit Mfg. Co., St. Paul, Minn. (cloth filter and centrifugal separator)
Wagner Awning & Mfg. Co., Cleveland, O. (Dust recovery bags)
Western Blower Co., Seattle, Wash.
Western Precipitation Corp., Los Angeles, Calif.
Whiting Corp., Harvey, Ill.
Winkler & Sons, Inc., A. E., Milwaukee, Wis.
Young & Bertke Co., Cincinnati, O.

COLORIMETERS

Daigger & Co., A., Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Photovolt Corp., New York, N. Y.
Refinite Corp., Omaha, Neb.
Will Corp., Rochester, N .Y.

COMBUSTION CHAMBERS

See Chambers, Combustion, Preformed

COMBUSTION CONTROL

See Controls, Draft, Barometric; Regulators, Draft, Combustion; Systems, Combustion Control

COMBUSTION RECORDERS

See Recorders, Carbon Dioxide

COMPOUNDS, AIR FRESHENING

Air-Aid Corp., New York, N. Y.
Air Vent Corp., New York, N. Y.
Airkem, Inc., New York, N. Y.
Ampion Corp., Long Island City, N. Y.

COMPOUNDS, BOILER CLEANING

Acme Refining Co., The, Cleveland, O.
Agnew & Tomlinson, Long Island City, N. Y.
American Chemical Paint Co., Ambler, Pa.
American K. A. T. Corp., Garwood, N. J.
American Sand-Banum Co., Inc., New York, N. Y.
Anderson-Stolz Corp., Kansas City, Mo.
Aquatrol Laboratories, Inc., Clifton, N. J.
Bird-Archer Co., Philadelphia, Pa.
Blue Seal Chemical Co., Roselle Park, N. J.
Cannon Chemical Co., Inc., Cambridge, Mass.
Chemical Engineering Co., Dallas, Tex.
Continental Products Co., Euclid, O.
Dearborn Chemical Co., Chicago, Ill.
Diamond Chemical Products, New York, N. Y.
Dowell Inc., Tulsa, Okla.
Ferro-Nil Corp., New York, N. Y.
Grief, Edward C., Bogota, N. J.
Haering & Co., Inc., D. W., San Antonio, Tex.
Hagan Corp., Pittsburgh, Pa.
Hercules Chemical Co., Inc., New York, N. Y.
Hood Refining Co., Greensburg, Pa.
Houghton & Co., E. F., Philadelphia, Pa.
Kenite Laboratory, Inc., Madison, N. J.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Krehbiel Co., J. H., Chicago, Ill.
MacDermid Chemical Co., Bristol, Conn.
Madden & Co., P. E., Chicago, Ill.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
North American Fibre Products Co., The, Cleveland, O.
O'Brien Industries, Jersey City, N. J.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Permutit Co., New York, N. Y.
Perolin Co., Inc., Chicago, Ill.
Radiator Specialty Co., Charlotte, N. C.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Saverite Engineering Co., Hoboken, N. J.
Sulflo, Inc., Elizabeth, N. J.
Turco Products, Inc., Los Angeles, Calif.
Utility Laboratory, Inc., Brooklyn, N. Y.
Vinco Co., Inc., The, New York, N. Y.
Warren Refining & Chemical Co., The, Cleveland, O.
Water Service Laboratories, Inc., New York, N. Y.
Water Treatment Co. of America, Pittsburgh, Pa.
Western Chemical Co., Kansas City, Mo.
X Laboratories, Inc., New York, N. Y.

COMPOUNDS, BOILER AND RADIATOR SEALING

Ampion Corp., Long Island City, N. Y.
Arco Co., The, Cleveland, O.
Atlas Chemical Co., Marietta, O.
Blue Seal Chemical Co., Roselle Park, N. J.
Cannon Chemical Co., Inc., Cambridge, Mass.
Chicago Specialty Mfg Co., Chicago, Ill.
Dearborn Chemical Co., Chicago, Ill.
Desolvo Co., The, Pittsburgh, Pa.

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Diamond Chemical Products, New York, N. Y.
Halowax Products Div., Union Carbide & Carbon Corp., New York, N. Y.
Hampton-Cross Co., The, Louisville, Ky.
Hercules Chemical Co., Inc., New York, N. Y.
Kenite Laboratory, Inc., Madison, N. J.
Krehbiel Co., J. H., Chicago, Ill.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
National Engineering Products, Inc., Washington, D. C.
Quigley Co., Inc., New York, N. Y.
Radiator Specialty Co., Charlotte, N. C.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Star Products Co., New York, N. Y.
Sulflo, Inc., Elizabeth, N. J.
Utility Laboratory, Inc., Brooklyn, N. Y.
Vinco Co., Inc., The, New York, N. Y.
X Laboratories, Inc., New York, N. Y.

COMPOUNDS, CLEANING, AIR FILTER

Carbide and Carbon Chemicals Div., Union Carbide and Carbon Corp., New York, N. Y.
National Aniline Div., Allied Chemical & Dye Corp., New York, N. Y.
Oakite Products, Inc., New York, N. Y.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Turco Products, Inc., Los Angeles, Calif.

COMPOUNDS, CLEANING, PIPE COIL AND CONDENSER

American Chemical Paint Co., Ambler, Pa.
Anderson-Stolz Corp., Kansas City, Mo.
Apex All Weather Products, Chicago, Ill.
Aquatrol Laboratories, Inc., Clifton, N. J.
Bird-Archer Co., Philadelphia, Pa.
Blue Seal Chemical Co., Roselle Park, N. J.
Cannon Chemical Co., Inc., Cambridge, Mass.
Carolina Aniline & Extract Co., Inc., Charlotte, N. C.
Chemical Engineering Co., Dallas, Tex.
Dearborn Chemical Co., Chicago, Ill.
Dowell, Inc., Tulsa, Okla.
Haering & Co., Inc., D. W., San Antonio, Tex.
Hercules Chemicals Co., Inc., New York, N. Y.
MacDermid Chemical Co., Bristol, Conn.
Madden & Co., P. E., Chicago, Ill.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
North American Fibre Products Co., The, Cleveland, O.
Oakite Products, Inc., New York, N. Y.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Perolin Co., Inc., Chicago, Ill.
Radiator Specialty Co., Charlotte, N. C.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Turco Products, Inc., Los Angeles, Calif.
Utility Laboratory Inc., Brooklyn, N. Y.
Western Chemical Co., Kansas City, Mo.

COMPOUNDS, WELDING

Acme White Lead & Color Wks., Detroit, Mich.
Allen Co., Inc., L. B., Chicago, Ill.
Allied Weld-Craft, Inc., Indianapolis, Ind.
All-State Welding Alloys Co., Inc., White Plains, N. Y.
Aluminum Co. of America, Pittsburgh, Pa.
American Solder & Flux Co., Philadelphia, Pa.
Eutectic Welding Alloys Corp., New York, N. Y.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Marquette Mfg. Co., Minneapolis, Minn.
Metal & Thermit Corp., New York, N. Y.
Midland Paint & Varnish Co., Cleveland, O.
Modern Engineering Co., St. Louis, Mo.
Neilson Chemical Co., Detroit, Mich.
Powder Weld Process Co., The, Brooklyn, N. Y. (Powdered)
Presstite Engineering Co., St. Louis, Mo.
Sight Feed Generator Co., West Alexandria, O.
Special Chemicals Corp., New York, N. Y.
Thompson & Co., Oakmont, Pa.
Turco Products, Inc., Los Angeles, Calif.
Wolfe-Kote Co., Inc., Sheboygan, Wis.

COMPRESSOR BASES

See Bases and Pads, Vibration Isolating

COMPRESSORS, AIR

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Beach-Russ Co., New York, N. Y.
●Binks Mfg. Co., Chicago, Ill.
●Brunner Mfg. Co., Utica, N. Y.
Bury Compressor Co., Erie, Pa.
Chicago Pneumatic Tool Co., New York, N. Y.
Cooper-Bessemer Corp., Mt. Vernon, O.
Cooper Co., Clark, Palmyra, N. J.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Davey Compressor Co., Kent, O.
Dayton Air Compressor Co., The, Dayton, O.
DeVilbiss Co., The, Toledo, O.
Electric Sprayit Co., The, Sheboygan, Wis.
Essick Mfg. Co., Los Angeles, Calif.
Fuller Co., Catasaqua, Pa.
Gardner-Denver Co., Quincy, Ill.
Gilbert & Barker Mfg. Co., West Springfield, Mass.
Gray Co., Inc., Minneapolis, Minn.
Hobart Bros. Co., Troy, O.
●Ingersoll-Rand Co., New York, N. Y.
●Johnson Service Co., Milwaukee, Wis.
●Joy Mfg. Co., Pittsburgh, Pa.
Lammert & Mann Co., Chicago, Ill.
Lamson Corp., Blower Div., Syracuse, N. Y.
Lynch Corp., Toledo, O.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Nash Engineering Co., South Norwalk, Conn.
North Penn Co., New York, N. Y.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.
Schramm, Inc., West Chester, Pa.
Spencer Turbine Co., Hartford, Conn.
Union Steam Pump Co., Battle Creek, Mich.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Wayne Pump Co., Fort Wayne, Ind.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

COMPRESSORS, REFRIGERATING, CENTRIFUGAL

Carrier Corp., Syracuse, N. Y. (Carrene)
DeLaval Steam Turbine Co., Trenton, N. J. (Water vapor)
●Trane Co., The, LaCrosse, Wis.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
York Corp., York, Pa.

COMPRESSORS, REFRIGERATING, COMBINED WITH CONDENSER, WATER CHILLER, PIPING CONNECTIONS, AND CONTROLS

Carrier Corp., Syracuse, N. Y.
Diceler Div. of General Machine & Mfg. Co., Berwick, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Lehigh Mfg. Co., Div. of Lehigh Foundries, Inc., Lancaster, Pa.

COMPRESSORS, REFRIGERATING, RECIPROCATING

Baker Refrigeration Corp., South Windham, Me. ("Freon," Methyl chloride, Ammonia)
●Brunner Mfg. Co., Utica, N. Y. (Methyl chloride, "Freon," sulphur dioxide)
Carrier Corp., Syracuse, N. Y. ("Freon")
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O. (Radial)
Copeland Refrigeration Corp., Sidney, O.
●Curtis Refrigeration Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Deepfreeze Distributing Corp., Cincinnati, O. (low temperature industrial chilling equipment)
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Diceler Div. of General Machine & Mfg. Co., Berwick, Pa.
●Frick Co., Waynesboro, Pa. (Ammonia, "Freon")
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Machinery Co., Spokane, Wash.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Howe Ice Machine Co., Chicago, Ill. ("Freon," ammonia, methyl chloride)
●Ingersoll-Rand Co., New York, N. Y.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Kelvinator Div., Nash-Kelvinator Corp., Detroit, Mich.
Lehigh Mfg. Co., Div. of Lehigh Foundries, Inc., Lancaster, Pa.
Lynch Corp., Toledo, O.
Mills Industries, Inc., Chicago, Ill.
Ready-Power Co., The, Detroit, Mich. (radial unit driven by direct-connected internal combustion engine)
Reliance Refrigerating Machine Co., Chicago, Ill. ("Freon," methyl chloride, ammonia)
Reynolds Mfg. Co., Inc., Springfield, Mo.
●Schnacke, Inc., Evansville, Ind.
Servel, Inc., Electric Refrigeration Div., Evansville, Ind. ("Freon")
Starr Piano Co., Richmond, Ind.
Stewart Ice Machine Co., Pomona, Calif.
Tecumseh Products Co., Tecumseh, Mich.
●Trane Co., The, LaCrosse, Wis.
Universal Cooler Div. of Newport Steel Corp., Marion, O. ("Freon")
Vilter Mfg. Co., Milwaukee, Wis. ("Freon" ammonia)
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Wittenmeier Machinery Co., Chicago, Ill. (Carbon dioxide)
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill. (Ammonia, methyl chloride and "Freon")
York Corp., York, Pa. (Carbon dioxide, ammonia, "Freon")

COMPRESSORS, REFRIGERATING, STEAM JET

●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Croll-Reynolds Engrg. Co., Inc., New York, N. Y.
Elliott Co., Jeannette, Pa.

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Graham Mfg. Co., Inc., New York, N. Y.
●Ingersoll-Rand Co., New York, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
●Wheeler Mfg. Co., C. H., Philadelphia, Pa.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.

COMPRESSORS, STEAM BOOSTER

Bury Compressor Co., Erie, Pa.
Graham Mfg. Co.. Inc., New York, N. Y.
●Ingersoll-Rand Co., New York, N. Y.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONCRETE, INSULATING, FOR UNDERGROUND PIPING

●Zonolite Co., Chicago, Ill.

CONDENSATE DISPOSAL UNITS

See Units, Condensate Disposal

CONDENSATE RETURN

See Pumps, Condensation Return; Systems, Condensate Return

CONDENSATION METERS

See Meters, Condensation

CONDENSATION PUMPS

See Pumps, Condensation

CONDENSER TUBES

See Tubes, Condenser

CONDENSERS, REFRIGERATING, AIR COOLED

Heat-X-Changer Co., Inc., The New York, N. Y. (1/3 hp to 5 hp)
●Kramer Trenton Co., Trenton, N. J.
●Marlo Coil Co., St. Louis, Mo. (1 to 20 tons)
Peerless of America, Inc., Chicago, Ill.

CONDENSERS, REFRIGERATING, EVAPORATIVE

●Acme Industries, Inc., Jackson, Mich.
●American Blower Corp., Detroit, Mich.
American Coils Co., Newark, N. J.
American Cooling Tower Co., Kansas City, Mo.
Baker Refrigeration Corp., South Windham, Me.
●Baltimore Aircoil Co., Inc., Baltimore, Md.
●Buffalo Forge Co., Buffalo, N. Y.
●Bush Mfg. Co., West Hartford, Conn.
Carrier Corp., Syracuse, N. Y. ("Freon," ammonia)
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Crowell & Dunn, Inc., New York, N. Y.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Drayer & Hanson, Inc., Los Angeles, Calif.
●Frick Co., Waynesboro, Pa.
Frigidaire Div., General Motors Corp., Dayton, O.
●G & O Mfg. Co., New Haven, Conn.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
●Governair Corp., Oklahoma City, Okla.
Harry Cooling Towers, Inc., New York, N. Y.
●Kennard Corp., St. Louis, Mo.
●Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Inc., Atlanta, Ga.
Long Mfg. Div., Borg-Warner Corp., Detroit, Mich.
●Marlo Coil Co., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
Murray Mfg. Co., D. J., Wausau, Wis.
●Niagara Blower Co., New York, N. Y.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
Servel, Inc., Electric Refrigeration Div., Evansville, Ind.
●Schnacke, Inc., Evansville, Ind.
Temp-Control Inc., Peoria, Ill.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, LaCrosse, Wis.
●Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
●United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
XL Refrigerating Co., Chicago, Ill.
Yates-American Machine Co., Beloit, Wis.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

CONDENSERS, REFRIGERATING, SHELL AND COIL

●Acme Industries, Inc., Jackson, Mich.
American Coils Co., Newark, N. J.
Armstrong Co., Richard M., Westchester, Pa.
●Autorad Inc., Chicago, Ill.
Baker Refrigeration Corp., South Windham, Me.
Ball Welding Works, Inc., Oakland, Calif.
Brown Fintube Co., The, Elyria, O.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
●Davis Engineering Corp., Elizabeth, N. J.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
General Fittings Co., Providence, R. I.
Halstead & Mitchell, Pittsburgh, Pa. (Double tube)
Heat-X-Changer Co., Inc., The, New York, N. Y.
Howe Ice Machine Co., Chicago, Ill.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Lehigh Mfg. Co., Div. of Lehigh Foundries, Inc., Lancaster, Pa.
Nooter Corp., St. Louis, Mo.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa.
Refrigeration Economics Co., Inc., Canton, O.
Rome-Turney Radiator Co., Rome, N. Y.
●Trane Co., The, LaCrosse, Wis.
●Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
Vilter Mfg. Co., Milwaukee, Wis.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Whitlock Mfg. Co., Hartford, Conn.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

CONDENSERS, REFRIGERATING, SHELL AND TUBE

●Acme Industries, Inc., Jackson, Mich.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Coils Co., Newark, N. J.
Andale Co., Philadelphia, Pa.
●Autorad Inc., Chicago, Ill.
Armstrong Co., Richard M., Westchester, Pa.
Baker Refrigeration Corp., South Windham, Me.
Ball Welding Works, Inc., Oakland, Calif.
●Bell & Gossett Co., Morton Grove, Ill.
Biggs Boiler Works Co., E., Akron, O.
Brown Fintube Co., The, Elyria, O.
Carrier Corp., Syracuse, N. Y. (Carrene)
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
●Davis Engineering Corp., Elizabeth, N. J.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
●Frick Co., Waynesboro, Pa.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Heat Transfer Products, Inc., Carbondale, Pa.
Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
Howe Ice Machine Co., Chicago, Ill.
Industrial Mfg. & Engineering Co., Chicago, Ill.
●Kramer Trenton Co., Trenton, N. J.
National Radiator Co., The, Johnstown, Pa.
Nooter Corp., St. Louis, Mo.
Ohio Pipe Bending & Machine Co., Cleveland, O.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa.
Refrigeration Economics Co., Inc., Canton, O.
Reliance Refrigerating Machine Co., Chicago, Ill.
Reynolds Mfg. Co., Inc., Springfield, Mo.
Richmond Engrg. Co., Inc., Richmond, Va.
Roessing Mfg. Co., Pittsburgh, Pa.
Rome-Turney Radiator Co., Rome, N. Y.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
●Schnacke, Inc., Evansville, Ind.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
Stewart Ice Machine Co., Pomona, Calif.
●Trane Co., The, LaCrosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
Union Steam Pump Co., Battle Creek, Mich.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Whitlock Mfg. Co., Hartford, Conn.
Wittenmeier Machinery Co., Chicago, Ill.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

CONDENSERS, WATER DISTRIBUTORS FOR

See Distributors, Water, for Condensers

CONDENSING UNITS

See Compressors

● Advertisement in this issue. See Index to Advertisers, page 127d

CONDUCTORS AND PANELS, ELECTRICAL, FOR RADIANT HEATING

●Appleman Glass Works, Bergenfield, N. J.
Continental Radiant Glass Heat Corp., New York, N. Y.
Crittall Radiant Heating, Inc., Richard, New York, N. Y.
Electradiant Corp., Monterey, Calif.
Roberson Co., L. N., Seattle, Wash.
United States Rubber Co., New York, N. Y.

CONDUIT, UNDERGROUND PIPING

●American District Steam Co., North Tonawanda, N. Y.
Byers Co., A. M., Pittsburgh, Pa. (Wrought iron)
Dockstader, Inc., S. E., Washington, D. C.
●Durant Insulated Pipe Co., Palo Alto, Calif.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Johns-Manville, New York, N. Y.
Kaiser Co., E. B., Chicago, Ill.
Michigan Pipe Co., Bay City, Mich.
Orangeburg Mfg. Co., Orangeburg, N. Y.
●Porter & Co., Inc., H. W., Newark, N. J.
●Ric-wiL Co., Cleveland, O.
●Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Stillwater Clay Products Co., The, Cleveland, O.
Water Tight Underground Conduit, Houston, Tex.

CONNECTIONS, DUCT, FLEXIBLE (ASBESTOS, CANVAS, ETC.)

Canvas Products Co., St. Louis, Mo.
Chicago Metal Hose Corp., Maywood, Ill.
Felters Company, The, Boston, Mass.
●Grant Wilson Inc., Chicago, Ill.
Iden Mfg. Co., Chicago, Ill.
Polyken Industrial Tape Dept., Bauer & Black, Div. of the Kendall Co., Chicago, Ill.
St. Clair Rubber Co., Detroit, Mich.
United States Rubber Co., New York, N. Y.
Wagner Awning & Mfg. Co., Cleveland, O.

CONNECTORS, FILLING, HYDROSTATIC TEST

Mechanical Products Corp., Chicago, Ill.
Roylyn, Inc., Glendale, Calif.

CONNECTORS, FOR NON-METALLIC DUCT FABRICATION

Acme Steel Co., Chicago, Ill. (Strapping)
Klomparens Lock-Joint Mfg. Co., Inc., Washington, D. C.
Lumm Co., A. H., Toledo, O.
Sheetlock Co., Chicago, Ill.
United States Rubber Co., New York, N. Y.

CONTINUOUS HEATERS

See Heaters, Steam Jet, for Liquids

CONTROL, FOR INDIRECT WATER HEATERS

Barber-Colman Co., Rockford, Ill.
●Bell & Gossett Co., Morton Grove, Ill.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Detroit Lubricator Co., Detroit, Mich.
Edison, Inc., Thomas A., Instrument Div., West Orange, N. J.
●Hoffman Specialty Co., Indianapolis, Ind.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Penn Electric Switch Co., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
Watts Regulator Co., Lawrence, Mass.

CONTROL SYSTEMS, PRE-ASSEMBLED AS UNITS, FOR HEATING, COOLING AND VENTILATING

Factory Assemblies Using Other Manufacturers' Valves, Thermostats, Damper Motors, etc.

Bahnson Co., Winston-Salem, N. C.
Master Control Co., Akron, O.
Midwest Automatic Control Co., Des Moines, Ia.

CONTROLLERS AND STARTERS, MOTOR

●Allen-Bradley Co., Milwaukee, Wis.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
B/W Controller Corp., Birmingham, Mich.
Borg-Erickson Corp., Chicago, Ill.
Chase-Shawmut Co., Newburyport, Mass.
Clark Controller Co., Cleveland, O.
Cutler-Hammer, Inc., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.
Electric Machinery Mfg. Co., Minneapolis, Minn. (Synchronous motor)
Fitch, Allen & Co., Chicago, Ill.
Furnas Electric Co., Batavia, Ill.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Guardian Electric Mfg. Co., Chicago, Ill.
Ideal Electric & Mfg. Co., Mansfield, O.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
Monitor Controller Co., The, Boston, Mass.
●Penn Electric Switch Co., Goshen, Ind.
Redmond Co., Inc., Owosso, Mich.
Reynolds Electric Co., River Grove, Ill.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Trumbull Electric Mfg. Co., The, Plainville, Conn.
●Ward Leonard Electric Co., Mt. Vernon, N. Y.
Westinghouse Electric Corp., Pittsburgh, Pa.
Zenith Electric Co., Chicago, Ill.

CONTROLS, AIR CONDITIONING

See Humidistats; Indicator-Controllers; Operators, Damper; Operators, Valve; Recorder-Controllers; Regulators; Relays; Switches; Thermostats; Valves, Diaphragm; Valves, Refrigeration; Valves, Solenoid

CONTROLS, DOOR, ELECTRIC EYE (FOR AIR CONDITIONED ROOMS)

De-Tec-Tronic Laboratories, Inc., Chicago, Ill.
Ess Specialty Corp., Bergenfield, N. J.
Stanley Works, The, New Britain, Conn.
Westinghouse Electric Corp., Pittsburgh, Pa.

CONTROLS, DRAFT, BAROMETRIC

A-P Controls Corp., Milwaukee, Wis.
Atlas Utilities Co., Inc., Providence, R. I.
Barber-Colman Co., Rockford, Ill.
Bristol Co., The, Waterbury, Conn.
Campbell Engineering Co., Appleton, Wis.
●Cleveland Fuel Equipment Co., Cleveland, O.
Cole-Sewell Engineering Co., St. Paul, Minn.
Empire Ventilation Equipment Co., Long Island City, N. Y.
Field Control Div., H. D. Conkey & Co., Mendota, Ill.
Fuelguard Co., Dallas, Tex.
Hotstream Heater Co., Cleveland, O.
Krueger Sentry Gauge Co., Green Bay, Wis.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
●Perfex Corp., Milwaukee, Wis.
Preferred Utilities Mfg. Corp., New York, N. Y.
Salina Metal Products Co., Salina, Kan.
●Sarcotherm Controls, Inc., New York, N. Y.
Simplex Mfg. Co., Fond du Lac, Wis.
Skuttle Mfg. Co., Detroit, Mich.
United States Radiator Corp., Detroit, Mich.

CONTROLS, FIRE PROTECTION SPRINKLER SYSTEMS

American District Telegraph Co., New York, N. Y.
●Automatic Products Co., Milwaukee, Wis.
Barber-Colman Co., Rockford, Ill.
Clark Controller Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
Raisler Corp., Grimes Sprinkler Div., New York, N. Y.
Rockwood Sprinkler Co., Worcester, Mass.
Synchro-Start Products, Inc., Chicago, Ill.
Worner Electronic Devices, Rankin, Ill.

CONTROLS, FLAME FAILURE

American District Telegraph Co., New York, N. Y.
Bristol Co., The, Waterbury, Conn.
●Combustion Control Corp., Cambridge, Mass.
De-Tec-Tronic Laboratories, Inc., Chicago, Ill.
Drying Systems, Inc., Chicago, Ill.
Ess Specialty Corp., Bergenfield, N. J.
Fuelguard Co., Dallas, Tex.
●General Controls Co., Glendale, Calif.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Haney Gas Burner & Engrs., Monrovia, Calif.
●Mercoid Corp., The, Chicago, Ill.
●Mettler Co., Inc., The, Los Angeles, Calif.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneaoplis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
●Penn Electric Switch Co., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
●Webster Engineering Co., Tulsa, Okla.
Wheelco Instruments Co., Chicago, Ill.
White Mfg. Co., St. Paul, Minn.
●White-Rodgers Electric Co., St. Louis, Mo.

● Advertisement in this issue. See Index to Advertisers, page 127d

CONTROLS, HEATING

See Alarms; Humidistats; Indicator-Controllers; Operators, Damper; Operators, Valve; Recorder-Controllers; Regulators; Relays; Switches; Systems, Combustion Control; Systems, Heating; Thermostats; Valves, Balancing, Radiator; Valves, Diaphragm; Valves, Flow Control; Valves, Mixing; Valves, Pressure Reducing and Regulating; Valves, Radiator; Valves, Solenoid

CONTROLS, PUSH-PULL

See Shafts, Flexible, Push-Pull, for Control

CONTROLS, REFRIGERATION

See Humidistats; Operators, Valve; Relays; Switches; Thermostats; Valves, Refrigeration; Valves, Solenoid

CONVECTORS

See Radiation, Convection Type

CONVEYORS, COAL AND ASH

Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Chain Belt Co., Milwaukee, Wis.
Chicago Fire Brick Co., Chicago, Ill.
CraneVeyor Corp., Los Angeles, Calif.
Farquhar Co., A. B., York, Pa.
Hager Bros., Rockford, Ill.
Jeffrey Mfg. Co., Columbus, O.
●Joy Mfg. Co., Pittsburgh, Pa.
Link-Belt Co., Chicago, Ill.
Sprout, Waldron & Co., Muncy, Pa.
Standard Transmission Equipment Co., Pasadena, Calif.
●Stephens-Adamson Mfg. Co., Aurora, Ill.
Whiting Corp., Harvey, Ill.

COOLERS, CRANE CAB

●Dravo Corp., Pittsburgh, Pa.
●Trane Co., The, LaCrosse, Wis.

COOLERS, EVAPORATIVE

See Units, Air Conditioning, Summer, Evaporative Cooling Type

COOLERS, OIL

American Cooling Tower Co., Kansas City, Mo.
●American District Steam Co., North Tonawanda, N. Y.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Andale Co., Philadelphia, Pa.
Armstrong Co., Richard M., Westchester, Pa.
●Bell & Gossett Co., Morton Grove, Ill.
Brown Fintube Co., The, Elyria, O.
Clifford Mfg. Co., Div. of Standard-Thomson Corp., Waltham, Mass.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
●Davis Engineering Corp., Elizabeth, N. J.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Fluor Corp., Ltd., The, Los Angeles, Calif.
●G & O Mfg. Co., New Haven, Conn.
Gilbert Brass Foundry Co., St. Louis, Mo.
Graham Mfg. Co., Inc., New York, N. Y.
Griscom-Russell Co., The, New York, N. Y.
Halstead & Mitchell, Pittsburgh, Pa.
Heat-X-Changer Co., Inc., The, New York, N. Y.
Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
Kold-Hold Mfg. Co., Lansing, Mich.
●Marlo Coil Co., St. Louis, Mo.
●Modine Mfg. Co., Racine, Wis.
Murray Mfg. Co., D. J., Wausau, Wis.
National Pipe Bending Co., New Haven, Conn.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
●Perfex Corp., Milwaukee, Wis.
Refrigeration Economics Co., Inc., Canton, O.
Reliable Products Mfg. Co., Brooklyn, N. Y.
Rome-Turney Radiator Co., Rome, N. Y.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., Erie, Pa.
●Struthers Wells Corp., Titusville, Pa.
●Taco Heaters, Inc., Providence, R. I.
Temprite Products Corp., Birmingham, Mich.
●Trane Co., The, LaCrosse, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
Whitlock Mfg. Co., Hartford, Conn.
Williams Co., Inc., B. S., Mt. Vernon, N. Y.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

COOLERS, UNIT (FLOOR TYPE)

Not air conditioning units, but floor mounted unit with coil and centrifugal fans without filters, for connection to remote compressor or cold water supply. For air conditioning units see Units, Air Conditioning

●Acme Industries, Inc., Jackson, Mich.
●American Blower Corp., Detroit, Mich.
Baker Refrigeration Corp., South Windham, Me.
●Baltimore Aircoil Co., Inc., Baltimore, Md.
●Buffalo Forge Co., Buffalo, N. Y.
●Bush Mfg. Co., West Hartford, Conn.
Carrier Corp., Syracuse, N. Y.
Conditionaire Unit Co., Chicago, Ill.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Drayer & Hanson, Inc., Los Angeles, Calif.
Economy Equipment Co., Chicago, Ill.
●Frick Co., Waynesboro, Pa.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
●Governair Corp., Oklahoma City, Okla.
Howe Ice Machine Co., Chicago, Ill.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
King Co., The, Owatonna, Minn.
Larkin Coils, Inc., Atlanta, Ga.
●Marlo Coil Co., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
Modine Mfg. Co., Racine, Wis.
Murray Mfg. Co., D. J., Wausau, Wis.
●Niagara Blower Co., New York, N. Y.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
Rigidbilt Inc., Chicago, Ill.
Rinehart Inc., Richmond, Ind.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Temp-Control Inc., Peoria, Ill.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, La Crosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

COOLERS, UNIT (SUSPENDED TYPE)

Not air conditioning units, but suspended unit with coil and propeller fan, without filters, for connection to remote compressor or cold water supply. For air conditioning units, see Units, Air Conditioning

●American Blower Corp., Detroit, Mich.
American Coils Co., Newark, N. J.
American Cooling Tower Co., Kansas City, Mo.
Auburn Burner Co., Auburn, Ind.
Baker Refrigeration Corp., South Windham, Me.
Betz Corp., Hammond, Ind.
●Buffalo Forge Co., Buffalo, N. Y.
●Bush Mfg. Co., West Hartford, Conn.
Carrier Corp., Syracuse, N. Y.
Conditionaire Unit Co., Chicago, Ill.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Drayer & Hanson, Inc., Los Angeles, Calif.
Economy Equipment Co., Chicago, Ill.
●Fedders-Quigan Corp., Buffalo, N. Y.
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
●Governair Corp., Oklahoma City, Okla.
Howe Ice Machine Co., Chicago, Ill.
Ilg Electric Ventilating Co., Chicago, Ill.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
King Co., The, Owatonna, Minn.
●Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Inc., Atlanta, Ga.
●Marlo Coil Co., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
Merchant & Evans Co., Philadelphia, Pa.
Murray Mfg. Co., D. J., Wausau, Wis.
●Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
●Rempe Co., Chicago, Ill.
Rigidbilt Inc., Chicago, Ill.
Rinehart Inc., Richmond, Ind.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Tenney Engineering, Inc., Newark, N. J.
Thermal Co., Inc., Milwaukee, Wis.
●Trane Co., The, La Crosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.

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●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Wilson Engineering Corp., Chicago, Ill.
●Wing Mfg. Co., L. J., Linden, N. J.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

COOLING COILS

See Surface, Cooling

COOLING SURFACE

See Surface, Cooling

COOLING TOWERS

See Towers, Cooling

COOLING UNITS

See Units, Air Conditioning; Coolers, Unit

COPPER PIPE

See Pipe, Brass and Copper

COPPER SHEETS

See Sheets, Copper

COPPER TUBE FITTINGS

See Fittings, Copper Tube

COPPER TUBE FITTINGS, FLARED

See Fittings, Copper Tube, Flared

COPPER TUBING

See Tubing, Brass and Copper

CORROSION PREVENTIVES

See Devices, Electrolytic, for Preventing Corrosion; Treatment, Steam System, to Inhibit Corrosion; and Treatment, Water, to Inhibit Corrosion

COUNTERS, DUST

Bausch & Lomb Optical Co., Rochester, N. Y.
Hill, E. Vernon & Co., Chicago, Ill.
Mine Safety Appliances Co., Pittsburgh, Pa.
Service to Industry, West Hartford, Conn.
Willson Products, Inc., Reading, Pa.

COUPLINGS, FLEXIBLE, POWER TRANSMISSION

Ajax Flexible Coupling Co., Westfield, N. Y.
American Flexible Coupling Co., Erie, Pa.
Blood Brothers Machine Co., Allegan, Mich. (Universal joints)
Boston Gear Wks., Inc., North Quincy, Mass.
Brooks Equipment Corp., Hoboken, N. J.
Browning Mfg. Co., Inc., Maysville, Ky.
Caldwell Co., W. E., Louisville, Ky.
Central Die Casting & Mfg. Co., Inc., Chicago, Ill.
Certified Flexible Couplings, New York, N. Y.
Chain Belt Co., Milwaukee, Wis.
Chicago Die Casting Mfg. Co., Chicago, Ill.
Congress Drives Div., Tann Corp., Detroit, Mich.
●Crocker-Wheeler Div. Elliott Co., Ampere, N. J.
Davidson Co., M. T., Brooklyn, N. Y.
De Laval Steam Turbine Co., Trenton, N. J.
Diamond Chain Co., Inc., Indianapolis, Ind.
Falk Corp., Milwaukee, Wis.
Guardian Products Corp., Michigan City, Ind.
Jeffrey Mfg. Co., Columbus, O.
Jones Foundry & Machine Co., W. A., Chicago, Ill.
Koppers Co., Inc., Pittsburgh, Pa.
Link-Belt Co., Indianapolis, Ind.
Lord Mfg. Co., Erie, Pa.
Lovejoy Flexible Coupling Co., Chicago, Ill.
Medart Co., St. Louis, Mo.
Mercury Clutch Div., Automatic Steel Products, Inc., Canton, O. (automatic centrifugal clutch)
Morse Chain Co., Detroit, Mich.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
Philadelphia Gear Works, Inc., Philadelphia, Pa.
Piezo Mfg. Corp., New York, N. Y.
Poole Foundry & Machine Co., Baltimore, Md.
Ramsey Chain Co., Inc., Albany, N. Y.
Royersford Foundry & Machine Co., Inc., Royersford, Pa.
Shallcross Co., Philadelphia, Pa.
Smith & Serrell, Inc., Newark, N. J.
Sprout, Waldron & Co., Muncy, Pa.
Stow Mfg. Co., Binghamton, N. Y.
Thermoid Co., Trenton, N. J.
United States Rubber Co., New York, N. Y.
●Waldron Corp., John, New Brunswick, N. J.
Westinghouse Electric Corp., Pittsburgh, Pa.
Whitney Chain Co., Hartford, Conn.
Wood's Sons Co., T. B., Chambersburg, Pa.

COUPLINGS, PIPE

Aero-Coupling Corp., Burbank, Calif.
Aeroquip Corp., Jackson, Mich.
Alabama Pipe Co., Anniston, Ala. (Cast iron)
Byers Co., A. M., Pittsburgh, Pa. (Wrought iron)
Camco Products Inc., New Haven, Conn.
Capitol Mfg. & Supply Co., Columbus, O.
Champion Machine & Forging Co., Cleveland, O.
Chase Brass & Copper Co., Waterbury, Conn.
Clow & Sons, James B., Chicago, Ill.
Continental-Diamond Fibre Co., Newark, Del.
Cooper-Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Detroit Brass & Malleable Works, Detroit, Mich.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Drinkwater, Inc., Waukegan, Ill.
Fischer & Porter Co., Hatboro, Pa. (glass)
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
●Gustin Bacon Mfg. Co., Kansas City, Mo.
Harrisburg Steel Corp., Harrisburg, Pa.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Illinois Malleable Iron Co., Chicago, Ill.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
King Union Co., Inc., Hillsgrove, R. I.
●Ladish Co., Cudahy, Wis.
Malleable Iron Fittings Co., Branford, Conn.
Morris Coupling & Clamp Co., Ellwood City, Pa.
●Mueller Brass Co., Port Huron, Mich.
National Tube Co., United States Steel Corp. Sub., Pittsburgh, Pa.
Parker Appliance Co., The, Cleveland, O.
Pittsburgh Steel Co., Pittsburgh, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
●Rhode Island Fittings Co., Providence, R. I.
Semler Co., Jeannette, Pa.
Stockham Valves & Fittings, Birmingham, Ala.
Stokes Molded Products, Inc., Trenton, N. J. (Hard rubber)
Union Metal Works, Chelsea, Mass.
United States Stoneware Co., New York, N. Y.
Victaulic Co. of America, New York, N. Y.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
Watson-Stillman Co., Roselle, N. J.
Wheeling Machine Products Co., Wheeling, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
●Youngstown Sheet & Tube Co., Youngstown, O.

COUPLINGS, PIPE, DETACHABLE

Aero-Coupling Corp., Burbank, Calif.
Aeroquip Corp., Jackson, Mich.
Crabb Engineering Co., Detroit, Mich.
Drinkwater, Inc., Waukegan, Ill.
Gates Engineering Co., Wilmington, Del.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Morris Coupling & Clamp Co., Ellwood City, Pa.
Roylyn, Inc., Glendale, Calif.
Victaulic Co. of America, New York, N. Y.
Wiggins Oil Tool Co., Inc., E. B., Los Angeles, Calif.

CRANE CAB COOLERS

See Coolers, Crane Cab

CUT-OFFS, LOW WATER, HEATING BOILER

B/W Controller Corp., Birmingham, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
●General Controls Co., Glendale, Calif.
Johnson Corp., The, Three Rivers, Mich.
Magnetrol, Inc., Chicago, Ill.
●Maid-O'-Mist, Inc., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
●Penn Electric Switch Co., Goshen, Ind.
Schaub Engineering Co., Fred H., Chicago, Ill.
Watts Regulator Co., Lawrence, Mass.
●Webster & Co., Warren, Camden, N. J.

CUTTERS, PIPE

American Pipe Tool Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Atkins & Co., E. C., Indianapolis, Ind.
Barnes Tool Co., The, New Haven, Conn.
Beaver Pipe Tools, Inc., Warren, O.
Bernz Co., Otto, Rochester, N. Y.
Capewell Mfg. Co., Hartford, Conn.
Continental Machine Co., Chicago, Ill.
Crown Die & Tool Co., Chicago, Ill.
Erie Tool Works, Erie, Pa.

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Hollands Mfg. Co., Erie, Pa.
Landis Machine Co., Inc., Waynesboro, Pa.
M-M-A, Inc., Lancaster, Pa.
Nye Tool Co., Chicago, Ill.
Oster Mfg. Co., Cleveland, O.
Quijada Tool Co., Inc., Los Angeles, Calif.
●Ridge Tool Co., Elyria, O.
Sac Tool Mfg. Co., St. Louis, Mo.
Toledo Pipe Threading Machine Co., Toledo, O.
Trimont Mfg. Co., Div. of Aetna Industrial Corp., Boston, Mass.
Wachs Co., E. H., The, Chicago, Ill. (pipe saw)

CUTTERS, TUBING

Armstrong Bros. Tool Co., Chicago, Ill.
Bernz Co., Otto, Rochester, N. Y.
Bonney Forge & Tool Works, Allentown, Pa.
Capewell Mfg. Co., Hartford, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Specialty Mfg. Co., Chicago, Ill.
Continental Machine Co., Chicago, Ill.
Couplings Co., Chicago, Ill.
Duro Metal Products Co., Chicago, Ill.
Everhot Products Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Landis Machine Co., Inc., Waynesboro, Pa.
●Mueller Brass Co., Port Huron, Mich.
Nye Tool Co., Chicago, Ill.
Parker Appliance Co., The, Cleveland, O.
Penn Brass & Copper Co., Erie, Pa.
Quijada Tool Co., Inc., Los Angeles, Calif.
●Ridge Tool Co., Elyria, O.
Sac Tool Mfg. Co., St. Louis, Mo.
Snap-on Tools Corp., Kenosha, Wis.
Trimont Mfg. Co., Div. of Aetna Industrial Corp., Boston, Mass.
Weatherhead Co., Cleveland, O.

DAMPER OPERATORS

See Operators, Damper

DAMPER REGULATORS

See Regulators, Damper Sets

DAMPERS, DUCT, MANUALLY OPERATED

Acme Mfg. Co., Holmesburg, Philadelphia, Pa.
Adams Co., The, Dubuque, Ia.
Air Control Products, Inc., Coopersville, Mich.
●Air & Refrigeration Corp., New York, N. Y.
Airecon Industries, Detroit, Mich.
American Foundry & Furnace Co., Bloomington, Ill.
American Warming & Ventilating Co., Toledo, O.
Corbman Bros., Inc., Philadelphia, Pa.
Elgo Shutter & Mfg. Co., Detroit, Mich.
Excelsior Steel Furnace Co., Chicago, Ill.
Goettl Bros. Metal Prod., Inc., Phoenix, Ariz.
Hart & Cooley Mfg. Co., Holland, Mich.
Inland Steel Products Co., Milwaukee, Wis.
Jacobs Co., B. & J., Cincinnati, O.
Kerentoff, G. L., Cincinnati, O.
Martens & Stormoen, Boston, Mass.
Meyer Mfg. Co., Detroit, Mich.
Ohio Products Co., Cleveland, O.
Salina Metal Products Co., Salina, Kan.
Sioux Steel Co., Sioux Falls, S. D.
Standard Furnace Supply Co., Omaha, Neb.
●Titus Mfg. Corp., Waterloo, Ia.
Thermix Corp., The, Greenwich, Conn.
●Tuttle & Bailey, Inc., New Britain, Conn.
United States Register Co., Battle Creek, Mich.
Young Regulator Co., Cleveland, O.

DAMPERS, DUCT, REMOTE CONTROLLED

●Air & Refrigeration Corp., New York, N. Y.
Airecon Industries, Detroit, Mich.
American Foundry & Furnace Co., Bloomington, Ill.
American Warming & Ventilating Co., Toledo, O.
●Anemostat Corp. of America, New York, N. Y.
Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Conoflow Corp., Philadelphia, Pa.
●Johnson Service Co., Milwaukee, Wis.
Meyer Mfg. Co., Detroit, Mich.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Powers Regulator Co., Chicago, Ill.
Shallcross Controls, Inc., Milwaukee, Wis.
Thermix Corp., The, Greenwich, Conn.
●Tuttle & Bailey, Inc., New Britain, Conn.
Vapor Heating Corp., Chicago, Ill.
Young Regulator Co., Cleveland, O.

DAMPERS, PULSATION, FOR PIPING SYSTEMS

Campbell Co., J. A., Long Beach, Calif.
Greer Hydraulics, Inc., Brooklyn, N. Y.
●Taylor Instrument Companies, Rochester, N. Y.

DEAERATORS

Buflovac Equipment Div. of Blaw-Knox Co., Buffalo, N. Y.
Cochrane Corp., Philadelphia, Pa.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Croll-Reynolds Engrg. Co., Inc., New York, N. Y.
Elliott Co., Jeannette, Pa.
Fluor Corp., Ltd., The, Los Angeles, Calif.
General Heaters & Regulators Co., Chicago, Ill.
Graham Mfg. Co., Inc., New York, N. Y.
Graver Water Conditioning Co., New York, N. Y.
Heat Transfer Products, Inc., Carbondale, Pa.
Hoppes Mfg. Co., Inc., Springfield, O.
Permutit Co., New York, N. Y.
Refinite Corp., Omaha, Neb.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Schaub Engineering Co., Fred H., Chicago, Ill.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
●Swartwout Co., Cleveland, O.
Whitlock Mfg. Co., Hartford, Conn.
Worthington Pump & Machinery Corp., Harrison, N. J.

DEEP WELL PUMPS

See Pumps, Deep Well

DEHUMIDIFIERS, ABSORPTION AND ADSORPTION

●Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
Carbide and Carbon Chemicals Div., Union Carbide and Carbon Corp., New York, N. Y.
Cargocaire Engineering Corp., New York, N. Y. (for ships)
Carrier Corp., Syracuse, N. Y.
Daly, Merritt & Sullivan, Inc., Falls Church, Va.
Dow Chemical Co., The, Midland, Mich.
Dry Air Products Corp., Washington, D. C.
Drying Systems, Inc., Chicago, Ill.
Dryomatic Corp. of America, Baltimore, Md.
Floridin Co., Warren, Pa.
Kaufman Co., H. J., Detroit, Mich.
●Niagara Industrial Corp., New York, N. Y.
Pittsburgh Lectrodryer Corp., Pittsburgh, Pa.
●Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Selas Corp. of America, Philadelphia, Pa.
Socony-Vacuum Oil Co., Inc., New York, N. Y.
Solvay Sales Div., Allied Chemical & Dye Corp., New York, N. Y.
Somers, Inc., H. J., Detroit, Mich.
Surface Combustion Corp., Toledo, O.
Tamms Industries, Inc., Chicago, Ill.

DEHUMIDIFIERS, ELECTRIC PLUG-IN, FOR SMALL SPACES

Ajax Corp. of America, Chicago, Ill.
Aqua-Sorb Co., East Orange, N. J.
Cargocaire Engineering Corp., New York, N. Y.
Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
Dryomatic Corp. of America, Baltimore, Md.
Ebco Mfg. Co., Columbus, O.
Frigidaire Div., General Motors Corp., Dayton, O.
Haertel Co., Walter, Minneapolis, Minn.
Kauffman Air Conditioning Co., St. Louis, Mo.
Sterling Air Conditioning Corp., Washington, D. C.
●United States Air Conditioning Corp., Minneapolis, Minn.

DEHUMIDIFIERS, SPRAY

See Washers, Air

DEHUMIDIFYING UNITS

See Units, Air Conditioning; Dehumidifiers, Absorption and Adsorption

DEHYDRANT AND ACID NEUTRALIZER, FOR REFRIGERATING SYSTEMS

Highside Chemicals Co., Clifton, N. J.
●Mueller Brass Co., Port Huron, Mich.
Selas Corp. of America, Philadelphia, Pa.
Weatherhead Co., Cleveland, O.

DEHYDRATORS, REFRIGERANT

A-P Controls Corp., Milwaukee, Wis.
Aluminum Co. of America, Pittsburgh, Pa.
Aminco Refrigeration Products Co., Detroit, Mich.
Eagle Chemical Co., Inc., Joliet, Ill.
Floridin Co., Warren, Pa.
Frigidaire Div., General Motors Corp., Dayton, O.
●Henry Valve Co., Melrose Park, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
Madden Brass Products Co., The, Chicago, Ill.
McIntire Connector Co., Newark, N. J.
●Mueller Brass Co., Port Huron, Mich.
Remco, Inc., Zelienople, Pa.

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Selas Corp. of America, Philadelphia, Pa.
●Sporlan Valve Co., St. Louis, Mo.
Superior Valve and Fittings Co., Pittsburgh, Pa.
Techniflex Corp., Port Jervis, N. Y.
Wabash Mfg. Co., Chicago, Ill.
Weatherhead Co., Cleveland, O.
Western Thermal Equipment Co., Los Angeles, Calif.

DESTROYERS, SOOT, CHEMICAL

Allen Co., Robert G., Mechanicsville, N. Y.
Ampion Corp., Long Island City, N. Y.
Coughlan Co., G. N., West Orange, N. J.
Desolvo Co., The, Pittsburgh, Pa.
Diamond Chemical Products, New York, N. Y.
Healy Ruff Co., St. Paul, Minn.
Hercules Chemical Co., Inc., New York, N. Y.
Kenite Laboratory, Inc., Madison, N. J.
MacDermid Chemical Co., Bristol, Conn.
Madden & Co., P. E., Chicago, Ill.
National Aluminate Corp., Chicago, Ill.
Nutmeg Chemical Co., New Haven, Conn.
O'Brien Industries, Jersey City, N. J.
Perolin Co., Inc., Chicago, Ill.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Saverite Engineering Co., Hoboken, N. J.
Tamms Industries, Inc., Chicago, Ill.
Vinco Co., Inc., The, New York, N. Y.
Warren Refining & Chemical Co., The, Cleveland, O.
Western Chemical Co., Kansas City, Mo.

DESUPERHEATERS, STEAM

●Babcock & Wilcox Co., New York, N. Y.
Brown Fintube Co., The, Elyria, O.
Cochrane Corp., Philadelphia, Pa.
Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Foster Wheeler Corp., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
Northern Equipment Div., Continental Foundry & Machine Co., Erie, Pa.
Foundry & Machine Co., Erie, Pa.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
●Spence Engineering Co., Inc., Walden, N. Y.
Whitlock Mfg. Co., Hartford, Conn.

DETECTORS, LEAK, REFRIGERANT

Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Goss Gas, Inc., Pittsburgh, Pa.
Highside Chemicals Co., Clifton, N. J.
Justrite Mfg. Co., Chicago, Ill.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Turco Products, Inc., Los Angeles, Calif.
Turner Brass Wks., Sycamore, Ill.
Vacuum-Electronic Engineering Co., Brooklyn, N. Y.
Western Thermal Equipment Co., Los Angeles, Calif.

DETECTORS, LEAK, UNDERGROUND PIPING

Fisher Research Laboratory, Inc., Palo Alto, Calif.
Wilkinson Products Co., Los Angeles, Calif.

DEVICES, ELECTROLYTIC, FOR PREVENTING CORROSION

Aqua Electric Scale Control, Inc., Cleveland, O.
Brown Electric Co., Oklahoma City, Okla.
Electro Rust-Proofing Corp., Belleville, N. J.
Magnode Products, Inc., Brooklyn, N. Y.
McRay Products Co., South Pasadena, Calif.
Rotometals, Inc., San Francisco, Calif.
Wallace & Tiernan Co., Inc., Newark, N. J.

DEW POINT INDICATORS

See Indicators, Dew Point

DIAPHRAGM VALVES

See Valves, Diaphragm

DIESEL ENGINES

See Engines, Diesel, for Fan, Pump and Compressor Drives

DIFFUSERS, AIR, HIGH VELOCITY

See also Grilles; Panels, Perforated, for Air Diffusion; Registers

●A-J Mfg. Co., Kansas City, Mo.
Air Control Products, Inc., Coopersville, Mich.
●Air Devices, Inc., New York, N. Y.
Aladdin Heating Corp., Oakland, Calif.
●Anemostat Corp. of America, New York, N. Y.
Barber-Colman Co., Rockford, Ill.
●Connor Engineering Corp., W. B., Danbury, Conn.
Demuth & Sons, Charles, Mineola, L. I., N. Y.
Hart & Cooley Mfg. Co., Holland, Mich.
●Titus Mfg. Corp., Waterloo, Ia.
●Tuttle & Bailey, Inc., New Britain, Conn.

DIFFUSION, AIR

See Panels, Perforated, for Air Diffusion

DISTRIBUTORS, WATER, FOR CONDENSERS

●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Martocello & Co., Jos. A., Philadelphia, Pa.
York Corp., York, Pa.

DOOR CONTROLS

See Controls, Door, Electric Eye

DOORS AND PANELS, ACCESS

Adams Co., The, Dubuque, Ia.
●Air & Refrigeration Corp., New York, N. Y.
American Foundry & Furnace Co., Bloomington, Ill.
American Sheet Metal Works, New Orleans, La.
●Auer Register Co., Cleveland, O.
Biersach & Niedermeyer Co., Milwaukee, Wis.
Camloc Fastener Corp., New York, N. Y. (Fasteners for)
Canton Stoker Corp., Canton, O.
●Clarage Fan Co., Kalamazoo, Mich.
Decatur Iron & Steel Co., Decatur, Ala.
Falstrom Co., Passaic, N. J.
Inland Steel Products Co., Milwaukee, Wis.
International Steel Co., Evansville, Ind.
Kane Mfg. Corp., Kane, Pa.
Kirk & Blum Mfg. Co., Cincinnati, O.
Knapp Bros. Mfg. Co. Inc., Cincinnati, O.
Lockjoint Wood Products Co., Wichita, Kan.
Lumm Co., A. H., Toledo, O.
Technical Ply-Woods, Chicago, Ill.
Truscon Steel Co., Youngstown, O.
Walsh Co., L. M., The, Boston, Mass.
Western Wire & Iron Works, Inc., Chicago, Ill. (Metal)

DRAFT CONTROL

See Controls, Draft, Barometric; Regulators, Draft, Combustion

DRAFT GAGES

See Gages, Indicating, Draft

DRAFT RECORDERS

See Recorders, Draft

DRAFT REGULATORS

See Controls, Draft, Barometric; Regulators, Draft, Combustion

DRAWING TEMPLATES, PIPING

See Templates, Drawing, Piping

DRIERS

See Dehydrators, Refrigerant

DRILLS, ELECTRIC AND PNEUMATIC, PORTABLE

Albertson & Co., Inc., Sioux City, Ia.
Black & Decker Mfg. Co., Towson, Md.
Buckeye Tools Corp., Dayton, O.
Chicago Pneumatic Tool Co., New York, N. Y.
Cincinnati Electrical Tool Co., The, Cincinnati, O.
Clark Electric Co., Jas., Jr., Louisville, Ky.
Fasco Industries, Inc., Rochester, N. Y.
Greyhound A. C. Arc Welder Corp., Brooklyn, N. Y.
Independent Pneumatic Tool Co., Aurora, Ill.
●Ingersoll-Rand Co., New York, N. Y.
●Joy Mfg. Co., Pittsburgh, Pa.
Keller Tool Co., Grand Haven, Mich.
Lee Co., K. O., Aberdeen, S. D.
Mall Tool Co., Chicago, Ill.
Millers Falls Co., Greenfield, Mass.
Paramount Products Co., New York, N. Y.
Portable Electric Tools, Inc., Chicago, Ill.
R C S Tool Sales Corp., Joliet, Ill.
Signal Electric Mfg. Co., Menominee, Mich.
Skilsaw, Inc., Chicago, Ill.
Spartan Tool Co., Chicago, Ill.
Speedway Mfg. Co., Chicago (Cicero), Ill.
Stanley Electric Tools, Div. of The Stanley Works, New Britain, Conn.
Syntron Co., Homer City, Pa.
U. S. Electrical Tool Co., Cincinnati, O.
Van Dorn Electric Tool Co., Towson, Md.
Wiley's Carbide Tool Co., Detroit, Mich.
Wodack Electric Tool Corp., Chicago, Ill.

DRILLS, POWDER OPERATED

Mine Safety Appliances Co., Pittsburgh, Pa. (drives studs for pipe hangers, etc. into concrete)

●Ramset Fasteners, Inc., Cleveland, O.
Tempo Products Co., Cleveland, O.

DRIVES, CHAIN

Caldwell Co., W. E., Louisville, Ky.
Chain Belt Co., Milwaukee, Wis.
CraneVeyor Corp., Los Angeles, Calif.
Diamond Chain Co., Inc., Indianapolis, Ind.
Horton Mfg. Co., Minneapolis, Minn.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., Indianapolis, Ind.
Medart Co., St. Louis, Mo.
Morse Chain Co., Detroit, Mich.
Ramsey Chain Co., Inc., Albany, N. Y.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Whitney Chain Co., Hartford, Conn.

DRIVES, FLAT BELT

See also Belting, Leather and Belting, Rubber

American Pulley Co., Philadelphia, Pa.
Baldwin Belting, Inc., New York, N. Y.
Browning Mfg. Co., Inc., Maysville, Ky.
Caldwell Co., W. E., Louisville, Ky.
Chicago Belting Co., Chicago, Ill.
Chicago Die Casting Mfg. Co., Chicago, Ill.
Dick Co., Inc., R. & J., Passaic, N. J.
●Dodge Mfg. Corp., Mishawaka, Ind.
Gates Rubber Co., The, Denver, Colo.
Goodrich Co., B. F., Akron, O.
Horton Mfg. Co., Minneapolis, Minn.
Medart Co., St. Louis, Mo.
Pyott Foundry & Machine Co., Chicago, Ill.
Rhoads & Sons, J. E., Philadelphia, Pa.
Rockwood Mfg. Co., Inc., Indianapolis, Ind.
Williams & Son, I. B., Dover, N. H.
Wood's Sons Co., T. B., Chambersburg, Pa.

DRIVES, POWER FOR PIPE THREADING

Beaver Pipe Tools, Inc., Warren, O.
Ridge Tool Co., Elyria, O.
Toledo Pipe Threading Machine Co., Toledo, O.

DRIVES, V BELT

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulley Co., Philadelphia, Pa.
Baldwin Belting, Inc., New York, N. Y.
Browning Mfg. Co., Inc., Maysville, Ky.
Chicago Belting Co., Chicago, Ill.
Chicago Die Casting Mfg. Co., Chicago, Ill.
Congress Drives Div., Tann Corp., Detroit, Mich.
Continental Rubber Wks., Erie, Pa.
Dayton Rubber Co., Dayton, O.
Dick Co., Inc., R. & J., Passaic, N. J.
●Dodge Mfg. Corp., Mishawaka, Ind.
Gates Rubber Co., The, Denver, Colo.
Goldens' Foundry & Machine Co., Columbus, Ga.
Goodrich Co., B. F., Akron, O.
Horton Mfg. Co., Minneapolis, Minn.
Jones Foundry & Machine Co., W. A., Chicago, Ill.
Maurey Mfg. Corp., Chicago, Ill.
Medart Co., St. Louis, Mo.
Pyott Foundry & Machine Co., Chicago, Ill.
Rockwood Mfg. Co., Inc., Indianapolis, Ind.
Salsbury Motors, Inc., Div., Wayne Mfg. Co., Pomona, Calif.
Thermoid Co., Trenton, N. J.
V-Belt Clutch Co., Los Angeles, Calif.
Wood's Sons Co., T. B., Chambersburg, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

DRIVES, VARIABLE SPEED

See Changers, Speed, Hydraulic Coupling; Changers, Speed, Mechanical; Reducers, Speed; Pulleys and Sheaves, for Belt Drives

DRYERS, INDUSTRIAL (COMPARTMENT, TUNNEL CONVEYOR, VACUUM, SPRAY, ROTARY, ETC.)

Bowen Engineering, Inc., North Branch, N. J.
Buflovac Equipment Div. of Blaw-Knox Co., Buffalo, N. Y.
●Campbell Heating Co., Des Moines, Ia.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Drying Systems, Inc., Chicago, Ill.
Economy Equipment Co., Chicago, Ill.
Enterprise Engine & Machinery Co., Div. of General Metals Corp., San Francisco, Calif.
Instant Drying Corp., New York, N. Y.
●Jackson & Church Co., Saginaw, Mich. (Dryer for corn, grain, hops, and wood)
Kirk & Blum Mfg. Co., Cincinnati, O.
Link-Belt Co., Chicago, Ill.
Louisville Drying Machine Div., General American Transportation Corp., Louisville, Ky.
Mahr Mfg. Co., Div. of Diamond Iron Wks., Inc., Minneapolis, Minn.
Newcomb-Detroit Co., Detroit, Mich.
Peters-Dalton, Inc., Detroit, Mich.
Proctor & Schwartz, Inc., Philadelphia, Pa.
Raymond Pulverizer Div., Combustion Engineering-Superheater, Inc., Chicago, Ill.
Ross Engineering Corp., J. O., New York, N. Y.
Shallcross Controls, Inc., Milwaukee, Wis.
Stokes Machine Co., F. J., Philadelphia, Pa.
●Struthers Wells Corp., Titusville, Pa.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Western Precipitation Corp., Los Angeles, Calif.

DRYERS, REFRIGERANT

See Dehydrators, Refrigerant

DUAL THERMOSTATS

See Thermostats, Two Temperature or Dual

DUCT CONNECTIONS

See Connections, Duct, Flexible; Connectors for Non-Metallic Duct Fabrication

DUCT FURNACES

See Heaters, Duct

DUCT HEATERS

See Heaters, Duct

DUCT INSULATION

See Insulation, Duct

DUCT THERMOSTATS

See Thermostats, Duct Type

DUCT TURNING VANES

See Vanes, Duct Turning, Prefabricated

DUCTS AND DUCT FITTINGS, PREFABRICATED, METALLIC

Acer & Whedon, Inc., Medina, N. Y.
Acme Mfg. Co., Holmesburg, Philadelphia, Pa.
Adelta Mfg. Co., Inc., Philadelphia, Pa.
Ajax Furnace Fitting Co., Div. of Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.
Champion Furnace Pipe Co., Peoria, Ill.
Char-Gale Mfg. Co., Minneapolis, Minn.
Chicago Furnace Supply Co., Chicago, Ill.
Chicago Metal Hose Corp., Maywood, Ill.
Clayton & Lambert Mfg. Co., Louisville, Ky.
Corbman Bros., Inc., Philadelphia, Pa.
Excelsior Steel Furnace Co., Chicago, Ill.
General Corporation, Minneapolis, Minn.
Goettl Bros. Metal Prod., Inc., Phoenix, Ariz.
Gray Metal Products, Inc., Rochester, N. Y.
Henry Furnace Co., The, Medina, O.
Howes-Woods Co., Cambridge, Mass.
Inland Steel Products Co., Milwaukee, Wis.
International Heater Co., Utica, N. Y.
Jacobs Co., B. & J., Cincinnati, O.
Lennox Furnace Co., Marshalltown, Ia., Syracuse, N. Y., & Columbus, O.
Littleford Bros., Inc., Cincinnati, O.
Meyer & Bro. Co., F., Peoria, Ill.
Moncrief Furnace Co., Atlanta, Ga.
●Mueller Furnace Co., L. J., Milwaukee, Wis.
Ohio Valley Hardware & Roofing Co., Evansville, Ind.
Schecter Brothers Co., Philadelphia, Pa.
Sioux Steel Co., Sioux Falls, S. D.
Smith-Raymond Co., Columbus, Ga.
Standard Furnace Supply Co., Omaha, Neb.
United States Register Co., Battle Creek, Mich.
Van Noorden Co., E. Boston, Mass.
Viking Mfg. Corp., Cleveland, O.
Waverly Heating Supply Co., Boston, Mass.
Williamson Heater Co., Cincinnati, O.

DUCTS AND DUCT FITTINGS, PREFABRICATED, NON-METALLIC

American Ventilating Hose Co., New York, N. Y.
Arrowhead Rubber Co., Downey, Calif.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
du Pont de Nemours & Co., E. I., Fabrics & Finishes Dept., Wilmington, Del.
Flexible Tubing Corp., Branford, Conn.
Haveg Corp., Newark, Del. (for fumes)
Jacobs Co., B. & J., Cincinnati, O.
Johns-Manville, New York, N. Y.
Knight, Maurice A., Akron, O. (also Permanite)
Smith-Raymond Co., Columbus, Ga.
United States Rubber Co., New York, N. Y.

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DUST COLLECTORS

See Collectors, Dust

DUST COUNTERS

See Counters, Dust

ECONOMIZERS, FUEL

●Babcock & Wilcox Co., New York, N. Y.
Combustion Engineering-Superheater, Inc., New York, N. Y.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Edge Moor Iron Works, Inc., Edge Moor, Del.
Foster Wheeler Corp., New York, N. Y.
Green Fuel Economizer Co., Beacon, N. Y.
Richmond Engineering Co., Inc., Richmond, Va.
Springfield Boiler Co., Springfield, Ill.

EJECTORS, SEWAGE

American-Marsh Pumps, Inc., Battle Creek, Mich.
●Chicago Pump Co., Chicago, Ill.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davidson Co., M. T., Brooklyn, N. Y.
●Economy Pumps, Inc., Hamilton, O.
●Nash Engineering Co., South Norwalk, Conn.
Penberthy Injector Co., Detroit, Mich.
Schutte & Koerting Co., Philadelphia, Pa.
Swaby Mfg. Co., Chicago, Ill.
Taber Pump Co., Buffalo, N. Y.
●Weil Pump Co., Chicago, Ill.
Whittington Pump & Engineering Corp., Indianapolis, Ind.
Yeomans Bros. Co., Chicago, Ill.

ELBOWS, BALANCING, FOR HOT WATER HEATING SYSTEMS

Detroit Lubricator Co., Detroit, Mich.
Hammond Brass Works, Hammond, Ind.
Kehm Corp., The, Chicago, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.

ELECTRIC AIR CLEANERS

See Cleaners, Air, Electrical

ELECTRICAL RADIANT HEATING

See Conductors and Panels, Electrical, for Radiant Heating

ELECTRIC DRILLS

See Drills, Electric, Portable

ELECTRIC MOTORS

See Motors, Electric

ELECTRIC PIPE HEATING SYSTEMS

See Systems, Electric Pipe Heating

ELECTRIC SHEARS

See Shears, Electric, Portable

ELECTRIC UNIT HEATERS

See Heaters, Unit, Electric Heating Element

ELECTRIC WATER HEATERS

See Heaters, Water, Electric

ELECTRODES, ARC WELDING

Air Reduction Sales Co., New York, N. Y.
All-State Welding Alloys Co., Inc., White Plains, N. Y.
Allegheny Ludlum Steel Corp., Pittsburgh, Pa. (Stainless)
Allied Weld-Craft, Inc., Indianapolis, Ind.
Aluminum Co. of America, Pittsburgh, Pa.
American Agile Corp., Cleveland, O.
American Brass Co., Waterbury, Conn.
American Steel & Wire Co., United States Steel Corp. Subsidiary, Cleveland, O.
Arcos Corp., Philadelphia, Pa.
Electric Arc., Inc., Newark, N. J.
Eutectic Welding Alloys Corp., New York, N. Y.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Harnischfeger Corp., Milwaukee, Wis.
Hobart Bros. Co., Troy, O.
International Nickel Co., Inc., The, New York, N. Y.
Jessop Steel Co., Washington, Pa.
Laclede Steel Co., St. Louis, Mo.
●Lincoln Electric Co., Cleveland, O.
Marquette Mfg. Co., Minneapolis, Minn.
Maurath, Inc., Cleveland, O.
McKay Co., Pittsburgh, Pa.
Metal & Thermit Corp., New York, N. Y.
Mir-O-Col Alloy Co., Inc., Los Angeles, Calif. (for hard facing)
National Carbon Co., New York, N. Y.
National Cylinder Gas Co., Chicago, Ill.
Page Steel & Wire Division of American Chain & Cable Co., Inc., Monessen, Pa.
Sight Feed Generator Co., West Alexandria, O.
Smith Corp., A. O., Milwaukee, Wis.
Trindl Products, Ltd., Chicago, Ill.
Welding Apparatus Co., Chicago, Ill.
Westinghouse Electric Corp., Pittsburgh, Pa.
Wilson Welder & Metals Co., Inc., New York, N. Y.

ELIMINATORS, AIR, FOR HEATING AND PIPING SYSTEMS

●Anderson Co., V. D., The, Cleveland, O.
●Armstrong Machine Works, Three Rivers, Mich.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
●Bell & Gossett Co., Morton Grove, Ill.
●Dole Valve Co., The, Chicago, Ill.
Gorton Heating Corp., Cranford, N. J.
●Hoffman Specialty Co., Indianapolis, Ind.
●Illinois Engineering Co., Chicago, Ill.
Keeney Mfg. Co., Newington, Conn.
Livingstone Engineering Co., Worcester, Mass.
●Maid-O'-Mist, Inc., Chicago, Ill.
●Marsh Corp., Jas. P., Skokie, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Moreheat Distribution, Inc., Cincinnati, O.
Mouat Vapor Heating Co., The, Cleveland, O.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Multiplex Mfg. Co., Berwick, Pa.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
●Sterling, Inc., Milwaukee, Wis.
●Taco Heaters, Inc., Providence, R. I.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Vapor Specialty Co., New York, N. Y.
Wright-Austin Co., Detroit, Mich.

ENAMELS AND LACQUERS

Acme White Lead & Color Works, Detroit, Mich.
Acorn Refining Co., Cleveland, O.
American-Marietta Co., Chicago, Ill.
Arco Co., The, Cleveland, O.
Atlas Powder Co., North Chicago, Ill.
Baer Bros., New York, N. Y.
Blue Ridge Talc Co., Inc., Henry, Va.
Claronex Products, Inc., Brooklyn, N. Y.
Cordo Chemical Co., Norwalk, Conn.
Debevoise Co., The, Brooklyn, N. Y.
Devoe & Raynolds Co., Inc., New York, N. Y.
du Pont de Nemours & Co. (Inc.) E. I., Fabrics & Finishes Dept., Wilmington, Del.
Hague & Co., Alfred, Brooklyn, N. Y.
Heresite & Chemical Co., Manitowoc, Wis.
Hilo Varnish Corp., Brooklyn, N. Y.
Horn Co., Inc., A. C., Long Island City, N. Y.
Inter-Coastal Paint Corp., East St. Louis, Ill.
Interchemical Corp., Finishes Div., Newark, N. J.
Irvington Varnish and Insulator Co., Irvington, N. J.
Knight, Maurice A., Akron, O.
Koppers Co., Inc., Pittsburgh, Pa.
Krehbiel Co., J. H., Chicago, Ill.
Mass & Waldstein Co., Newark, N. J.
Master Mechanics Co., Cleveland, O.
Midwest Products Co., Port Byron, Ill.
O'Brien Corp., The, South Bend, Ind.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Quigley Co., Inc., New York, N. Y.
Reilly Tar & Chemical Corp., Indianapolis, Ind.
Sherwin-Williams Co., The, Cleveland, O.
Sipe & Co., James B., Pittsburgh, Pa.
Sonneborn Sons, Inc., L., New York, N. Y.
Southport Paint Co., Div. Wesson Oil & Snowdrift Co., Inc., Savannah, Ga.
Thompson & Co., Oakmont, Pa.
Tropical Paint & Oil Co., Cleveland, O.
Truscon Laboratories, Detroit, Mich.
U. S. Gutta Percha Paint Co., Providence, R. I.
United Chromium, Inc., New York, N. Y.
Warren Refining & Chemical Co., The, Cleveland, O.
Wilbur & Williams Co., Boston, Mass.
Wilhelm Co., A., Reading, Pa.
Zaco Laboratories, Div. Zip Abrasive Co., Cleveland, O. (spray units)

ENGINES, DIESEL, FOR FAN, PUMP AND COMPRESSOR DRIVES

American Locomotive Co., Auburn, N. Y.
Anderson Diesel Engine Co., Philadelphia, Pa.
Baldwin Locomotive Wks., Philadelphia, Pa.
Buda Co., Harvey, Ill.
Caterpillar Tractor Co., Peoria, Ill.
Chicago Pneumatic Tool Co., New York, N. Y.
Continental Motors Corp., Muskegon, Mich.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Detroit Diesel Engine Div., General Motors Corp., Detroit, Mich.
Fairbanks, Morse & Co., Chicago, Ill.
Hill Diesel Engine Corp., Lansing, Mich.
●Ingersoll-Rand Co., New York, N. Y.

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Ready-Power Co., The, Detroit, Mich.
Synchro-Start Products, Inc., Chicago, Ill. (automatic controls to start, stop and protect internal combustion engines)
Waukesha Motors Co., Waukesha, Wis.
Witte Engine Works, Div. of Oil Well Supply Co., United States Steel Corp., Sub., Kansas City, Mo.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES, GAS, FOR FAN, PUMP AND COMPRESSOR DRIVES

Buda Co., Harvey, Ill.
Chicago Pneumatic Tool Co., New York, N. Y.
Continental Motors Corp., Detroit, Mich.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Fairbanks Morse & Co., Chicago, Ill.
●Ingersoll-Rand Co., New York, N. Y.
Ready-Power Co., The, Detroit, Mich.
Salsbury Motors, Inc., Div., Wayne Mfg. Co., Pomona, Calif.
Synchro-Start Products, Inc., Chicago, Ill. (automatic controls to start, stop and protect internal combustion engines)
Waukesha Motor Co., Waukesha, Wis.
Witte Engine Works, Div. of Oil Well Supply Co., United States Steel Corp., Sub., Kansas City, Mo.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES, STEAM, FOR FAN, PUMP AND COMPRESSOR DRIVES

●Ames Iron Wks., Div. of Pierce, Butler Radiator Corp., Oswego, N. Y.
Harrisburg Machinery Corp., Harrisburg, Pa.
Skinner Engine Co., Erie, Pa.
Troy Engine & Machine Co., Troy, Pa.
Vilter Mfg. Co., Milwaukee, Wis.
Wachs Co., E. H., The, Chicago, Ill.

EQUIPMENT, BALANCING

Bear Mfg. Co., Industrial Div., Rock Island, Ill.
Gisholt Machine Co., Madison, Wis.
Olsen Testing Machine Co., Tinius, Willow Grove, Pa.

EVAPORATIVE CONDENSERS

See Condensers, Refrigerating, Evaporative

EVAPORATIVE COOLERS

See Units, Air Conditioning, Summer, Evaporative Cooling Type

EVAPORATORS

See Chillers, Water

EXCHANGERS, HEAT

Adams Co., Inc., R. P., Buffalo, N. Y. (water to air)
●Aerofin Corp., Syracuse, N. Y.
Airecon Industries, Detroit, Mich.
Aluminum Co., of America, Pittsburgh, Pa.
●American District Steam Co., North Tonawanda, N. Y.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Armstrong Co., Richard M., Westchester, Pa.
Baker Refrigeration Corp., Inc., South Windham, Me.
●Bell & Gossett Co., Morton Grove, Ill.
Biggs Boiler Wks., Co., The, E. Akron, O.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Bowen Engineering, Inc., North Branch, N. J.
Brown Fintube Co., The, Elyria, O.
Brownell Co., The, Dayton, O.
Clifford Mfg. Co., Div. of Standard-Thomson Corp., Waltham, Mass.
●Condenser Service & Engineering Co., Inc., Hoboken, N. Y.
Corning Glass Works, Corning, N. Y.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Dahlquist Mfg. Co., Inc., Div. of Process Engineering Inc., Somerville, Mass.
●Davis Engineering Corp., Elizabeth, N. J.
Devine Mfg. Co., J. J., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Drayer & Hanson, Inc., Los Angeles, Calif.
Drying Systems, Inc., Chicago, Ill.
Duriron Co., The, Dayton, O. (acid resisting)
Eastern Industries, Inc., New Haven, Conn.
Foster Wheeler Corp., New York, N. Y.
General Ceramics & Steatite Corp., Keasbey, N. J. (Impervious Graphite)
General Fittings Co., Providence, R. I.
General Heaters & Regulators Co., Chicago, Ill.
Gilbert Brass Foundry Co., St. Louis, Mo.
Goodyer Industries, Inc., Chicago, Ill.
Graham Mfg. Co., Inc., New York, N. Y.
Graver Water Conditioning Co., New York, N. Y.
Griscom-Russell Co., The, New York, N. Y.
Heat Transfer Products, Inc., Carbondale, Pa.
Heat-X-Changer Co., Inc., The, New York, N. Y.
Heilman Boiler Wks., Inc., Allentown, Pa.
Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
●Joy Mfg. Co., Pittsburgh, Pa.
Kaiser Co., E. B., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Kellogg Co., M. W., The, New York, N. Y.
Kold-Hold Mfg. Co., Lansing, Mich.
Kopperman & Sons, Joseph, Philadelphia, Pa.
Koven & Bro., Inc., L. O., Jersey City, N. J.
Larkin Coils, Inc., Atlanta, Ga.
Lindy Heaters, Inc., New York, N. Y.
Madden & Co., P. E., Chicago, Ill.
Manitowoc Engineering Wks., Manitowoc, Wis.
●Marley Co., Inc., The, Kansas City, Kan.
●Marlo Coil Co., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
Minimite Co., Chicago, Ill.
●Modine Mfg. Co., Racine, Wis.
●Mueller Brass Co., Port Huron, Mich.
Murray Mfg. Co., D. J., Wausau, Wis.
National Carbon Co., New York, N. Y.
National Pipe Bending Co., New Haven, Conn.
National Radiator Co., The, Johnstown, Pa.
●Niagara Blower Co., New York, N. Y.
Nooter Corp., St. Louis, Mo.
Parker Appliance Co., The, Cleveland, O.
●Patterson-Kelley Co., Inc., East Stroudsburg, Pa.
Peerless of America, Inc., Chicago, Ill.
●Perfex Corp., Milwaukee, Wis.
●Prat-Daniel Corp., East Port Chester, Conn.
●Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Quaker City Iron Works, Philadelphia, Pa.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Reliable Products Mfg. Co., Brooklyn, N. Y.
Roessing Mfg. Co., Pittsburgh, Pa.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Schaub Engineering Co., Fred H., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., Erie, Pa.
Smith Corp., A. O., Milwaukee, Wis.
Stout & Sons, David, St. Louis, Mo.
●Struthers Wells Corp., Titusville, Pa.
Superior Valve & Fittings Co., Pittsburgh, Pa.
●Taco Heaters, Inc., Providence, R. I.
Techniflex Corp., Port Jervis, N. Y.
Thermal Industries, Indio, Calif.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, LaCrosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Vapor Heating Corp., Chicago, Ill.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
Westinghouse Electric Corp., Pittsburgh, Pa.
Whitlock Mfg. Co., Hartford, Conn.
Wilson Engineering Corp., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.
Yula Water Heaters, Inc., New York, N. Y.

EXCHANGERS, HEAT, REFRIGERANT SUCTION LINE

●Acme Industries, Inc., Jackson, Mich.
Armstrong Co., Richard M., Westchester, Pa.
Betz Corp., Hammond, Ind.
Brown Fintube Co., The, Elyria, O.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Davis Engineering Corp., Elizabeth, N. J.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Gerstein & Cooper Co., Inc., South Boston, Mass.
Heat-X-Changer Co., Inc., The, New York, N. Y.
●Kramer Trenton Co., Trenton, N. J.
●Marlo Coil Co., St. Louis, Mo.
●Mueller Brass Co., Port Huron, Mich.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Techniflex Corp., Port Jervis, N. Y.
Temprite Products Corp., Birmingham, Mich.
Wabash Mfg. Co., Chicago, Ill.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

EXHAUST HEADS

See Heads, Exhaust, for Pipe Lines

EXHAUSTERS, WELDING FUME

Aladdin Heating Corp., Oakland, Calif.
Allington & Curtis Mfg. Co., Saginaw, Mich.
●American Blower Corp., Detroit, Mich.
American Machine Products Co., Marshalltown, Ia.
Champion Blower & Forge Co., Lancaster, Pa.
Chelsea Fan & Blower Co., Inc., Plainfield, N. J.
Chicago Blower Corp., Chicago, Ill.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
Coppus Engineering Corp., Worcester, Mass.
Dana Fan & Blower Corp., Cincinnati, O.
Day Co., The, Minneapolis, Minn.

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Emerson Electric Mfg. Co., The, St. Louis, Mo.
●Gallaher Co., The, Omaha, Neb. & Owatonna, Minn.
●General Blower Co., Morton Grove, Ill.
●Jenn Air Products Co., Indianapolis, Ind.
Kirk & Blum Mfg. Co., Cincinnati, O.
Mine Safety Appliances Co., Pittsburgh, Pa.
Peters-Dalton, Inc., Detroit, Mich.
●Propellair Div., Robbins & Myers Inc., Springfield, O.
Ruemelin Mfg. Co., Milwaukee, Wis.
Torit Mfg. Co., St. Paul, Minn.
Utility Appliance Corp., Los Angeles, Calif.
Whiting Corp., Harvey, Ill.
●Wing Mfg. Co., L. J., Linden, N. J.
Wind-Way Fan & Ventilator Co., New Orleans, La.

EXPANDERS, TUBE

Crane Packing Co., Chicago, Ill.
●Knuth Engineering Co., Chicago, Ill.
Wilson, Inc., Thomas C., Long Island City, N. Y.

EXPANSION BENDS

See Bends, Expansion

EXPANSION BOLTS

See Bolts, Expansion

EXPANSION JOINTS

See Joints, Pipe, Expansion

EXPANSION TANKS

See Tanks, Expansion, for Hot Water Heating Systems

EXPANSION VALVES

See Valves, Refrigeration

EXTRACTORS, PIPE

Chicago Specialty Mfg. Co., Chicago, Ill.
Reps Tool Co., Inc., Hartford, Conn.
●Ridge Tool Co., Elyria, O.
Roddick Tool Co., Anaheim, Calif.

FABRICATED PIPING

See Bends; Headers; Joints, etc.

FABRICATORS, PIPE

See Headers, Welded; and Coils, Pipe

FAN BALANCING EQUIPMENT

See Equipment, Balancing

FAN BASES

See Bases and Pads, Vibration Isolating

FAN BLADES

See Blades, Propeller Fan

FAN HOUSING

See Housings, Fan, Centrifugal

FANS, AXIAL FLOW, PRESSURE TYPE

Aerovent Fan Co., Inc., Piqua, O. (Tubeaxial)
●American Blower Corp., Detroit, Mich.
●Buffalo Forge Co., Buffalo, N. Y.
Chicago Blower Corp., Chicago, Ill. (tubeaxial)
Circulators & Devices Mfg. Corp., Brooklyn, N. Y. (vaneaxial)
●De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Dynamic Air Engineering, Inc., Los Angeles, Calif.
Hartzell Propeller Fan Co., Piqua, O.
Ilg Electric Ventilating Co., Chicago, Ill.
International Engineering Inc., Dayton, O.
●Joy Mfg. Co., Pittsburgh, Pa. (vaneaxial)
●Moore Co., The, Marceline, Mo. (vaneaxial)
●Propellair Div., Robbins & Myers Inc., Springfield, O.
Sensenich Corp., Lancaster, Pa.
●South Bend Air Products, Inc., South Bend, Ind.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Wing Mfg. Co., L. J., Linden, N. J.

FANS, CENTRIFUGAL

Advance Aluminum Castings Corp., Chicago, Ill.
Advance Fan & Blower Co., Detroit, Mich.
Air Controls, Inc., Div. of Cleveland Heater Co., Cleveland, O.
Aladdin Heating Corp., Oakland, Calif.
Allington & Curtis Mfg. Co., Saginaw, Mich.
●American Blower Corp., Detroit, Mich.
American Foundry & Furnace Co., Bloomington, Ill.
American Machine Products Co., Marshalltown, Ia.
Bayley Blower Co., Milwaukee, Wis.
Bern's Mfg. Co., Chicago, Ill.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Blower Application Co., Milwaukee, Wis.
●Brundage Co., The, Kalamazoo, Mich.
●Buffalo Forge Co., Buffalo, N. Y.
●Campbell Heating Co., Des Moines, Ia.
Campbell Co., E. K., Kansas City, Mo.
Carolina Blower Co., Inc., Greensboro, N. C.
Century Fan & Ventilator Co., Stamford, Conn.
Champion Blower & Forge Co., Lancaster, Pa.
Chicago Blower Corp., Chicago, Ill.
Chicago Fan & Fin Coil Co., Chicago, Ill.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
●Clarage Fan Co., Kalamazoo, Mich.
Coppus Engineering Corp., Worcester, Mass.
Day Co., The, Minneapolis, Minn.
Duriron Co., Inc., Dayton, O. (Acid resisting)
Eastern Air Devices, Inc., Brooklyn, N. Y.
●Eclipse Fuel Engineering Co, Rockford, Ill.
Electrovent Fan & Mfg. Co., Chicago, Ill.
Garden City Fan Co., Chicago, Ill.
General Blower Co., Inc., Philadelphia, Pa.
●General Blower Co., Morton Grove, Ill.
General Products Co., Philadelphia, Pa.
Goettl Bros. Metal Products Inc., Phoenix, Ariz.
Green Fuel Economizer Co., Beacon, N. Y.
Hastings Air Conditioning Co., Hastings, Neb.
Ilg Electric Ventilating Co., Chicago, Ill.
Indiana Fan Company, Indianapolis, Ind.
International Sales Co., San Francisco, Calif.
●Jackson & Church Co., Saginaw, Mich.
Jaden Mfg. Co., Hastings, Neb.
Jamieson Mfg. Co., Dallas, Tex.
Jeffrey Mfg. Co., Columbus, O.
●Jenn Air Products Co., Indianapolis, Ind.
King Co., The, Owatonna, Minn.
Lau Blower Co., Dayton, O.
Lehigh Fan & Blower Co., Allentown, Pa.
MaGirl Foundry & Furnace Co., Bloomington, Ill.
Mahr Mfg. Co., Div. of Diamond Iron Wks., Inc., Minneapolis, Minn.
Martin Fan & Blower Co., Chicago, Ill.
Montag Stove & Furnace Wks., Portland, Ore.
Morrison Products Inc., Cleveland, O.
Motionair Co., Los Angeles, Calif.
Mountain States Equipment Co., Denver, Colo.
●Mueller Furnace Co., L. J., Milwaukee, Wis.
National Engineering & Mfg. Co., Kansas City, Mo.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
●New York Blower Co., Chicago, Ill.
Newcomb-Detroit Co., Detroit, Mich.
●Niagara Blower Co., New York, N. Y.
Northern Blower Co., Cleveland, O.
Palmer Mfg. Co., Phoenix, Ariz.
Peerless Electric Co., Warren, O.
Phelps Mfg. Co., Little Rock, Ark.
●Prat-Daniel Corp., East Port Chester, Conn.
Reynolds Mfg. Co., The, Grand Rapids, Mich.
Redmond Co., Inc., Owosso, Mich.
Ripley Co., Inc., L-R Blower Div., Middletown, Conn.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Schwitzer-Cummins Co., Indianapolis, Ind.
Sprout-Waldron & Co., Muncy, Pa.
Standard Electric Mfg. Co., West Berlin, N. J.
Torrington Mfg. Co., The, Western Div., Los Angeles, Calif.
Trade-Wind Motorfans, Inc., Los Angeles, Calif.
●Trane Co., The, LaCrosse, Wis.
United Electric Service Co., Wichita Falls, Tex.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Viking Air Conditioning Corp., Cleveland, O.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

FANS, PROPELLER

Acme Equipment Co., Muskogee, Okla.
Aeromatic Propeller Dept., Koppers Co., Inc., Baltimore, Md.
Aerovent Fan Co., Inc., Piqua, O.
Air Controls, Inc., Div. of Cleveland Heater Co., Cleveland, O.
Air Equipment Co., Chicago, Ill.
Airecon Industries, Inc., Detroit, Mich.
Aire-Foile Fan & Blower Co., Detroit, Mich.
Airmaster Corp., Chicago, Ill.
Allen Ventilator Div., Production Planning Co., Rochester, Mich.
●American Blower Corp., Detroit, Mich.
American Coolair Corp., Jacksonville, Fla.
Bar-Brook Mfg. Co., Inc., Shreveport, La.
Belter Electric Mfg. Co., G. J., The, St. Louis, Mo.
Bern's Mfg. Co., Chicago, Ill.
●Binks Mfg. Co., Chicago, Ill.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Broan Mfg. Co., Inc., Milwaukee, Wis.
Bronson Fan Mfg. Co., Los Angeles, Calif.
●Brundage Co., The, Kalamazoo, Mich.
●Buffalo Forge Co., Buffalo, N. Y.
C & H Air Conditioning Fan Co., Inc., Atlanta, Ga.
Carling Turbine Blower Co., Worcester, Mass.
Century Fan & Ventilator Co., Stamford, Conn.
Champion Blower & Forge Co., Lancaster, Pa.
Chelsea Fan & Blower Co., Inc., Plainfield, N. Y.
Chicago Blower Corp., Chicago, Ill.
Chicago Fan & Fin Coil Co., Chicago, Ill.

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Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
●Clarage Fan Co., Kalamazoo, Mich.
Climax Machinery Co., Indianapolis, Ind.
Commercialaire, Inc., Brooklyn, N. Y.
Coppus Engineering Corp., Worcester, Mass.
Dana Fan & Blower Corp., Cincinnati, O.
●De Bothezat Fans Div., American Machine & Metals, Inc., New York, N. Y.
DeVilbiss Co., The, Toledo, O.
Diehl Mfg. Co., Somerville, N. J.
Dual-Air Fan Co., South Elgin, Ill.
Dynamic Air Engineering, Inc., Los Angeles, Calif.
Eastern Air Devices, Inc., Brooklyn, N. Y.
Electrovent Fan & Mfg. Co., Chicago, Ill.
Emerson Electric Mfg. Co., The, St. Louis, Mo.
Fasco Industries, Inc., Rochester, N. Y.
Garden City Fan Co., Chicago, Ill.
●General Blower Co., Morton Grove, Ill.
Goettl Bros. Metal Prod. Inc., Phoenix, Ariz.
Guth Co., Edwin F., St. Louis, Mo.
Hartzell Propeller Fan Co., Piqua, O.
Holcomb & Hoke Mfg. Co., Inc., Indianapolis, Ind.
Holtum Mfg. Co., Freeport, Ill.
Hunter Fan & Ventilating Co., Inc., Memphis, Tenn.
Ilg Electric Ventilating Co., Chicago, Ill.
Indiana Fan Co., Indianapolis, Ind.
International Engineering, Inc., Dayton, O.
Jamieson Mfg. Co., Dallas, Tex.
Jeffrey Mfg. Co., Columbus, O.
●Jenn Air Products Co., Indianapolis, Ind.
Jordan & Co., Inc., Paul R., Indianapolis, Ind.
●Joy Mfg. Co., Pittsburgh, Pa.
Kernchen Co., Chicago, Ill.
King Co., The, Owatonna, Minn.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Lau Blower Co., Dayton, O.
Marathon Electric Mfg. Corp., Wausau, Wis.
Martin Fan & Blower Co., Chicago, Ill.
McLarty Systems, Battle Creek, Mich.
Meier Electric & Machine Co., Inc., Indianapolis, Ind.
●Moore Co., The, Marceline, Mo.
Motionair Co., Los Angeles, Calif.
Mountain States Equipment Co., Denver, Colo.
●Muckle Mfg. Co., Owatonna, Minn.
Myers Electric Co., Inc., Pittsburgh, Pa.
National Engineering & Mfg. Co., Kansas City, Mo.
National Gas Equipment Co., Inc., Terrell, Tex.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
●New York Blower Co., Chicago, Ill.
Peerless Electric Co., Warren, O. (Disc)
Perkins & Son, Inc., B. F., Holyoke, Mass.
Phelps Mfg. Co., Little Rock, Ark.
●Pritchard & Co., J. F., Kansas City, Mo.
●Propellair Div., Robbins & Myers, Inc., Springfield, O.
Reed Unit-Fans, Inc., New Orleans, La.
Reynolds Electric Co., River Grove, Ill.
Roto-Beam, Chicago, Ill.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Schwitzer-Cummins Co., Indianapolis, Ind.
Scott-Newcomb, Inc., St. Louis, Mo.
Sensenich Corp., Lancaster, Pa.
Signal Electric Mfg. Co., Menominee, Mich.
Somers, Inc., H. J., Detroit, Mich.
●South Bend Air Products, Inc., South Bend, Ind.
Standard Electric Mfg. Co., West Berlin, N. J.
Sutton Corp., O. A., Wichita, Kan.
Swift Mfg. Co., Inc., Hazel Park, Mich.
Thermal Industries, Indio, Calif.
Trade-Wind Motorfans, Inc., Los Angeles, Calif.
●Trane Co., The, LaCrosse, Wis.
Truflow Fan Co., Harmony, Pa.
United Electric Service Co., Wichita Falls, Tex.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.
Viking Air Conditioning Corp., Cleveland, O.
Western Blower Co., Seattle, Wash.
●Western Engineering & Mfg. Co., Los Angeles, Calif.
Wind-Way Fan & Ventilating Co., New Orleans, La.
●Wing Mfg. Co., L. J., Linden, N. J.

FASTENERS, INSULATION

Devices, Inc., New York, N. Y.
Dzus Fastener Co., Inc., Babylon, N. Y.
Moore, Inc., Goodloe, E., Danville, Ill.
Nelson Stud Welding Div., Morton Gregory Corp., Lorain, O.
●Ramset Fasteners, Inc., Cleveland, O.
Stic-Klip Mfg. Co., Cambridge, Mass.
Tinnerman Products, Inc., Cleveland, O.

FEEDERS, CHEMICAL, PROPORTIONING

American Water Softener Co., Philadelphia, Pa.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Bogue Electric Co., Paterson, N. J.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Elgin Softener Corp., Elgin, Ill.
Fischer & Porter Co., Hatboro, Pa.
Fuller Co., Catasauqua, Pa.
Graver Water Conditioning Co., New York, N. Y.
Haering & Co., Inc., D. W., San Antonio, Tex.
Jeffrey Mfg. Co., Columbus, O.
Madden & Co., P. E., Chicago, Ill.
Milton Roy Co., Philadelphia, Pa.
National Aluminate Corp., Chicago, Ill.
% Proportioneers, Inc. %, Providence, R. I.
Paddock Engineering Co., of Texas, Dallas, Tex.
Permutit Co., New York, N. Y.
Red Jacket Mfg. Co., Davenport, Ia.
Sprout, Waldron & Co., Muncy, Pa.
●Stephens-Adamson Mfg. Co., Aurora, Ill.
Syntron Co., Homer City, Pa.
Wallace & Tiernan Co., Inc., Newark, N. J.

FEEDERS, WATER, HEATING BOILER

Bailey Co., Chas. M., San Francisco, Calif.
Campbell Co., J. A., Long Beach, Calif.
Cissell Mfg. Co., Inc., W. M., Louisville, Ky.
Davis Regulator Co., Chicago, Ill.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Jacuzzi Bros., Inc., Richmond, Calif.
Johnson Corp., The, Three Rivers, Mich.
Kieley & Mueller, Inc., North Bergen, N. J.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Magnetrol, Inc., Chicago, Ill.
●Maid-O'-Mist, Inc., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
Morehead Mfg. Co., Detroit, Mich.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Nason Co., Detroit, Mich.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
●Penn Electric Switch Co., Goshen, Ind.
Schaub Engineering Co., Fred H., Chicago, Ill.
Sterling Engineering & Mfg. Corp., Hyde Park, Mass.
Templeton Bros., Hyde Park, Mass.
Watts Regulator Co., Lawrence, Mass.
●Webster & Co., Warren, Camden, N. J.

FEEDWATER HEATERS

See Deaerators

FIBER PACKING

See Packing, Fiber

FIBER PIPE

See Pipe, Fiber

FILTER GAGES

See Gages, Air Filter

FILTERS, AIR, AUTOMATIC

Air-Stream Filter Corp., St. Louis, Mo.
●American Air Filter Co., Inc., Louisville, Ky.
●Continental Air Filters, Inc., Louisville, Ky.
●Dollinger Corp., Rochester, N. Y.
●Farr Co., Los Angeles, Calif.
Ruemelin Mfg. Co., Milwaukee, Wis.

FILTERS, AIR, ELECTRIC

See Cleaners, Air, Electrical

FILTERS, AIR, GREASE

●Air Devices, Inc., New York, N. Y.
Air Filter Corp., Milwaukee, Wis.
Air-Maze Corp., Cleveland, O.
●American Air Filter Co., Inc., Louisville, Ky.
●Continental Air Filters, Inc., Louisville, Ky.
●Dollinger Corp., Rochester, N. Y.
●Farr Co., Los Angeles, Calif.
Filtair Mfg. Co., San Francisco, Calif.
●Research Products Corp., Madison, Wis.
Smith Filter Corp., Moline, Ill.

FILTERS, AIR, UNIT, CLEANABLE

●Air Devices, Inc., New York, N. Y.
Air Filter Corp., Milwaukee, Wis.
Air-Maze Corp., Cleveland, O.
Air-Stream Filter Corp., St. Louis, Mo.
●American Air Filter Co., Inc., Louisville, Ky.
Annis Air Filter Div., Royal Heaters, Inc., Alhambra, Calif.
Bard Mfg. Co., Bryan, O.
Carey Electronic Engineering Co., Metal Wool Div., Springfield, O.
Chicago Filter Co., Joliet, Ill.
●Continental Air Filters, Inc., Louisville, Ky.
Coppus Engineering Corp., Worcester, Mass.
●Dollinger Corp., Rochester, N. Y.
●Farr Co., Los Angeles, Calif.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Research Products Corp., Madison, Wis.
Somers, Inc., H. J., Detroit, Mich.
Smith Filter Corp., Moline, Ill.

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Supreme Air Filter Co., New York, N. Y.
Universal Air Filter Corp., Duluth, Minn.

FILTERS, AIR, UNIT, RENEWABLE MEDIA

●American Air Filter Co., Inc., Louisville, Ky.
Annis Air Filter Div., Royal Heaters, Inc., Alhambra, Calif.
●Dollinger Corp., Rochester, N. Y.
●Glasfloss, New York, N. Y.

FILTERS, AIR, UNIT, THROW-AWAY

●American Air Filter Co., Inc., Louisville, Ky.
Chicago Filter Co., Joliet, Ill.
Drico Industrial Corp., New York, N. Y.
●Glasfloss, New York, N. Y.
Morf Industries, Inc., Staten Island, N. Y.
●Owens-Corning Fiberglas Corp., Toledo, O.
●Research Products Corp., Madison, Wis.
Universal Air Filter Corp., Duluth, Minn.
Wilson & Co., Inc., Chicago, Ill.

FILTERS, AIR, ELECTRIC

See Cleaners, Air, Electrical

FILTERS, ODOR

See Adsorbers, Odor

FILTERS, PIPE LINE

Adams Co., Inc., R. P., Buffalo, N. Y.
Air-Maze Corp., Cleveland, Ohio.
●Alco Valve Co., St. Louis, Mo.
●American Air Filter Co., Inc., Louisville, Ky.
American Cyanamid & Chemical Corp., New York, N. Y.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Andale Co., Philadelphia, Pa.
Bowser, Inc., Fort Wayne, Ind.
CCA Products, Inc., Glendale, Calif.
Champion Laboratories, Inc., Meriden, Conn.
Cleveland Humidifier Co., Cleveland, O.
Commercial Filters Corp., Boston, Mass.
Conoflow Corp., Philadelphia, Pa.
Cuno Engineering Corp., Meriden, Conn.
DeVilbiss Co., The, Toledo, O.
●Dollinger Corp., Rochester, N. Y.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
●Fisher Governor Co., Marshalltown, Ia.
Fram Corp., Providence, R. I.
Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
General Filters, Inc., Detroit, Mich.
Johnson Corp., The, Three Rivers, Mich.
Kaye & MacDonald, Inc., West Orange, N. J.
Kraissl Co., Inc., The, Hackensack, N. J.
Mason-Neilan Regulator Co., Boston, Mass.
Micro Metallic Corp., Brooklyn, N. Y.
Moraine Products Div., General Motors Corp., Dayton, O. (Porous metal)
Morse-Smith-Morse, Inc., Watertown, Mass.
Newark Wire Cloth Co., Newark, N. J.
Norgren Co., C. A., Denver, Colo.
Norwalk Valve Co., South Norwalk, Conn.
Patrol Valve Co., The, Cleveland, O.
Permutit Co., New York, N. Y.
Rega Mfg. Co., Rochester, N. Y.
Scientific Instrument Co., Detroit, Mich.
Standard Machine & Mfg. Co., St. Louis, Mo.
Superior Valve and Fittings Co., Pittsburgh, Pa.
Trerice Co., Detroit, Mich.
W. G. B. Oil Clarifier, Inc., Kingston, N. Y. (for fuel oil)
Warner Lewis Co., Tulsa, Okla.
Winslow Engineering Co., Oakland, Calif.
Worthington Pump & Machinery Corp., Harrison, N. J.

FILTERS, REFRIGERANT

A-P Controls Corp., Milwaukee, Wis.
●Alco Valve Co., St. Louis, Mo.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Commercial Filters Corp., Boston, Mass.
●Dollinger Corp., Rochester, N. Y.
General Filter Co., Ames, Ia.
●Henry Valve Co., Melrose Park, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
McIntire Connector Co., Newark, N. J.
Moraine Products Div., General Motors Corp., Dayton, O. (Porous metal)
●Mueller Brass Co., Port Huron, Mich.
Newark Wire Cloth Co., Newark, N. J.
Phillips & Co., H. A., Chicago, Ill.
Remco, Inc., Zelienople, Pa.
●Sporlan Valve Co., St. Louis, Mo.
Standard Machine & Mfg. Co., St. Louis, Mo.
Wabash Mfg. Co., Chicago, Ill.
Weatherhead Co., Cleveland, O.

FILTERS, WATER

Adams Co., Inc., R. P., Buffalo, N. Y.
●Alco Valve Co., St. Louis, Mo.
American Cyanamid & Chemical Corp., New York, N. Y.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
American Water Softener Co., Philadelphia, Pa.
American Well Works, Aurora, Ill.
Aqua-Mist Co., Topeka, Kan. (Aspenwood fibre)
Bogue Electric Co., Paterson, N. J.
Bowser, Inc., Fort Wayne, Ind.
Cochrane Corp., Philadelphia, Pa.
Commercial Filters Corp., Boston, Mass.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Cuno Engineering Corp., Meriden, Conn.
●Dollinger Corp., Rochester, N. Y.
Duro Co., Dayton, O.
Elgin Softener Corp., Elgin, Ill.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
Graver Water Conditioning Co., New York, N. Y.
Greer Hydraulics, Inc., Brooklyn, N. Y.
●Henry Valve Co., Melrose Park, Ill.
Kaye & MacDonald, Inc., West Orange, N. J.
Liquid Conditioning Corp., Philadelphia, Pa.
Newark Wire Cloth Co., Newark, N. J.
Norwood Filtration Co., The, Holyoke, Mass.
% Proportioneers, Inc. %, Providence, R. I.
Permutit Co., New York, N. Y.
Red Jacket Mfg. Co., Davenport, Ia.
Refinite Corp., Omaha, Neb.
Sta-Rite Products, Inc., Delavan, Wis.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Winslow Engineering Co., Oakland, Calif.
Worthington Pump & Machinery Corp., Harrison, N. J.

FINNED TUBING

See Tubing, Finned

FIRE EXTINGUISHING SYSTEMS

See Systems, Fire Extinguishing

FIRE PUMPS

See Pumps, Fire

FITTINGS, BLOW PIPE

Ajax Furnace Fitting Co., Div. of Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.
Allington & Curtis Mfg. Co., Saginaw, Mich.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Carolina Blower Co., Inc., Greensboro, N. C.
Chicago Metal Mfg. Co., Chicago, Ill.
Day Co., The, Minneapolis, Minn.
Goethel Sheet Metal Works, Alfred, Milwaukee, Wis.
Kirk & Blum Mfg. Co., Cincinnati, O.
National Metal Fabricators, Chicago, Ill.
Newcomb-Detroit Co., Detroit, Mich.
Northern Blower Co., Cleveland, O.
Peters-Dalton, Inc., Detroit, Mich.
Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Schmieg Industries, Detroit, Mich.
Tiffin Eaves Trough Clamp Co., Tiffin, O.
Torit Mfg. Co., St. Paul, Minn.
United States Register Co., Battle Creek, Mich.
Winkler & Sons, Inc., A. E., Milwaukee, Wis.
Young & Bertke Co., Cincinnati, O.

FITTINGS, COPPER TUBE, COMPRESSION

Aircraft Fittings Co., Cleveland, O.
American Brass Co., Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Commonwealth Brass Corp., Detroit, Mich.
Couplings Co., Chicago, Ill.
●Dole Valve Co., The, Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Everhot Products Co., Chicago, Ill.
Hays Mfg. Co., Erie, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Oil Equipment Mfg. Corp., New Haven, Conn.
Wabash Mfg. Co., Chicago, Ill.
Weatherhead Co., Cleveland, O.

FITTINGS, COPPER TUBE, FLARED

Acheson Mfg. Co., Rankin, Pa.
Aircraft Fitting Co., Cleveland, O.
American Brass Co., Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Commonwealth Brass Corp., Detroit, Mich.
Couplings Co., Chicago, Ill.
●Dole Valve Co., The, Chicago, Ill.
Everhot Products Co., Chicago, Ill.
●Grinnell Co., Inc., Providence, R. I.
Hays Mfg. Co., Erie, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
●Mueller Brass Co., Port Huron, Mich.

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Northern Indiana Brass Co., Elkhart, Ind.
Oil Equipment Mfg. Corp., New Haven, Conn.
Parker Appliance Co., The, Cleveland, O.
Phoenix Brass Fittings Corp., Irvington, N. J.
Remco, Inc., Zelienople, Pa.
Scovill Mfg. Co., Brass Goods Div., Waterville, Conn.
Truetite Corp., The Bridgeport, Conn.
Weatherhead Co., Cleveland, O.

FITTINGS, COPPER TUBE, SOLDER

Acheson Mfg. Co., Rankin, Pa.
American Brass Co., Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Commonwealth Brass Corp., Detroit, Mich.
●Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
General Fittings Co., Providence, R. I.
Grabler Mfg. Co., Cleveland, O.
Hammond Brass Works, Hammond, Ind.
Lewin-Mathes Co., Lewin Metals Div., St. Louis, Mo.
●Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
Phoenix Brass Fittings Corp., Irvington, N. J.
Union Metal Works, Chelsea, Mass.
●Walworth Co., New York, N. Y. (Brazed)

FITTINGS, DRAINAGE, FIXED AIR BREAK

●Crane Co., Chicago, Ill.
Semler Co., Jeannette, Pa.

FITTINGS, HOT WATER HEATING SYSTEMS, ONE PIPE

Autostributor Co., Lansing, Mich. (manifold for connecting radiator branches)
●Bell & Gossett Co., Morton Grove, Ill.
General Heaters & Regulators Co., Chicago, Ill.
Gold Top Heating, Inc., Butte, Mont.
Kehm Corp., The, Chicago, Ill.
Mel Products Co., The, New Haven, Conn.
Sall Bros. Co., Rockford, Ill.
Semler Co., Jeannette, Pa.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, LaCrosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.

FITTINGS, LINED

American Hard Rubber Co., New York, N. Y. (Rubber)
Cement Lined Pipe Co., Lynn, Mass. (Lead and tin)
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Gates Engineering Co., Wilmington, Del.
Goodrich Co., B. F., Akron, O. (Rubber)
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead and tin)
Michigan Pipe Co., Bay City, Mich. (Wood, saran rubber)
National Lead Co., New York, N. Y. (Lead)
Northern Indiana Brass Co., Elkhart, Ind. (Tinned)
Raybestos-Manhattan, Inc., Passaic, N. J. (Rubber)
Resisto Pipe & Valve Co., East Cambridge, Mass. (lead)
United States Rubber Co., New York, N. Y. (Rubber)
Warren Foundry & Pipe Corp., New York, N. Y. (cement)

FITTINGS, PIPE, ALUMINUM

Aircraft Fitting Co., Cleveland, O.
Aluminum Co. of America, Pittsburgh, Pa.
●Ladish Co., Cudahy, Wis.
●Taylor Forge & Pipe Wks., Chicago, Ill.

FITTINGS, PIPE, BRASS, THREADED

Acheson Mfg. Co., Rankin, Pa.
Aircraft Fitting Co., Cleveland, O.
American Manganese Bronze Co., Philadelphia, Pa.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Bowser, Inc., Fort Wayne, Ind.
Chase Brass & Copper Co., Waterbury, Conn.
Commonwealth Brass Corp., Detroit, Mich.
Couplings Co., The, Chicago, Ill.
●Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Gilbert Brass Foundry Co., St. Louis, Mo.
Imperial Brass Mfg. Co., Chicago, Ill.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Lunkenheimer Co., Cincinnati, O.
New York Brass Fdry., New York, N. Y.
Parker Appliance Co., Cleveland, O.
Penn Mfg. Corp., of Washington, Pa., Washington, Pa.
Phoenix Brass Fittings Corp., Irvington, N. J.
U. S. Plug & Fitting Co., Cleveland, O. (pipe plugs)
Union Metal Wks., Chelsea, Mass.

●Walworth Co., New York, N. Y.
Weatherhead Co., The, Cleveland, O.

FITTINGS, PIPE, BRASS, WELDING

Chase Brass & Copper Co., Waterbury, Conn.
●Ladish Co., Cudahy, Wis.
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York., N. Y. (Brazed)

FITTINGS, PIPE, BRONZE, BRAZED

American Brass Co., Waterbury, Conn.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Union Metal Works, Chelsea, Mass.
●Walworth Co., New York, N. Y.

FITTINGS, PIPE, BRONZE, SOLDER

Acheson Mfg. Co., Rankin, Pa.
American Brass Co., Waterbury, Conn.
●Crane Co., Chicago, Ill.
Everhot Products Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
General Fittings Co., Providence, R. I.
Gilbert Brass Foundry Co., St. Louis, Mo.
Lewin-Mathes Co., Lewin Metals Div., St. Louis, Mo.
●Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
Union Malleable Mfg. Co., Ashland, O.
Union Metal Works, Chelsea, Mass.

FITTINGS, PIPE, CAST IRON, FLANGED

Alabama Pipe Co., Anniston, Ala.
American Cast Iron Pipe Co., Birmingham, Ala.
Clow & Sons, James B., Chicago, Ill.
●Crane Co., Chicago, Ill.
Duriron Co., Inc., Dayton, O. (Acid resisting)
Flori Pipe Co., The, St. Louis, Mo.
●Frick Co., Waynesboro, Pa.
●Grinnell Co., Inc., Providence, R. I.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kuhns Bros. Co., Dayton, O.
Lynchburg Foundry Co., Lynchburg, Va.
Malleable Iron Fittings Co., Branford, Conn.
National Valve & Mfg. Co., Pittsburgh, Pa.
Parks-Cramer Co., Fitchburg Mass. (Jacketed)
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Semler Co., Jeannette, Pa.
Stockham Valves & Fittings, Birmingham, Ala.
Straight Line Foundry & Machine Corp., Direct Separator Div., The, Syracuse, N. Y.
United States Pipe & Foundry Co., Burlington, N. J.
●Walworth Co., New York, N. Y.
Warren Foundry & Pipe Corp., New York, N. Y.

FITTINGS, PIPE, CAST IRON, THREADED

Clow & Sons, James B., Chicago, Ill.
●Crane Co., Chicago, Ill.
Detroit Brass & Malleable Wks., Detroit, Mich.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
●Frick Co., Waynesboro, Pa.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kuhns Bros. Co., Dayton, O.
Malleable Iron Fittings Co., Branford, Conn.
Ravena Iron Co., Ravena, N. Y.
Semler Co., Jeannette, Pa.
Somerville Iron Works, Somerville, N. J.
Stockham Valves & Fittings, Birmingham, Ala.
U. S. Plug & Fitting Co., Cleveland, O. (pipe plug)
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.

FITTINGS, PIPE, COMPRESSION

Aircraft Fitting Co., Cleveland, O.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Hays Mfg. Co., Erie, Pa.
Patrol Valve Co., The, Cleveland, O.

FITTINGS, PIPE, HARD RUBBER

American Hard Rubber Co., New York, N. Y.
Goodrich Co., B. F., Akron, O.
Luzerne Rubber Co., Trenton, N. J.
Raybestos-Manhattan, Inc., Passaic, N. J.
Stokes Molded Products, Inc., Trenton, N. J.
United States Rubber Co., New York, N. Y.

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FITTINGS, PIPE, LEAD

Alpha Metals, Inc., Brooklyn, N. Y.
Eagle Picher Co., Cincinnati, O.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Flemm Lead Co., Inc., Long Island City, N. Y.
Lead Lined Iron Pipe Co., Wakefield, Mass.
Lissberger & Son, Inc., Marks, Long Island City, N. Y.
National Lead Co., New York, N. Y.
Northwest Lead Co., Seattle, Wash.
Resisto Pipe & Valve Co., East Cambridge, Mass.
Rochester Lead Works, Inc., Rochester, N. Y.

FITTINGS, PIPE, MALLEABLE

Corley Co., Inc., The, Jersey City, N. J.
●Crane Co., Chicago, Ill.
Detroit Brass & Malleable Wks., Detroit, Mich.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jarecki, Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Malleable Iron Fittings Co., Branford, Conn.
Pittsburgh Valve & Fittings Corp., Barberton, O.
●Rhode Island Fittings Co., Providence, R. I.
Skinner Co., M. B., South Bend, Ind. (saddle tee)
Stockham Valves & Fittings, Birmingham, Ala.
Union Malleable Mfg. Co., Ashland, O.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.

FITTINGS, PIPE, MALLEABLE, BRAZED

Flagg & Co., Inc., Stanley G., Philadelphia, Pa.

FITTINGS, PIPE, NICKEL AND NICKEL ALLOY

Alloy Steel Products Co., Linden, N. J.
American Manganese Bronze Co., Philadelphia, Pa.
Cooper Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
Hasco Valve & Machine Co., Milwaukee, Wis.
International Nickel Co., Inc., The, New York, N. Y.
●Ladish Co., Cudahy, Wis.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
●Taylor Forge & Pipe Wks., Chicago, Ill.
Tri-Clover Machine Co., Kenosha, Wis.
Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York, N. Y.
Warren Foundry & Pipe Corp., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

FITTINGS, PIPE, PLASTIC

Acadia Synthetic Products Div., Western Felt Works, Chicago, Ill.
American Hard Rubber Co., New York, N. Y.
Commercial Plastics Co., Chicago, Ill.
Continental-Diamond Fibre Co., Newark, Del.
Haveg Corp., Newark, Del.
Mills Corp., Elmer E., Chicago, Ill.
North Penn Co., New York, N. Y.
United States Stoneware Co., New York, N. Y.
Yardley Plastics Co., Columbus, O.

FITTINGS, PIPE, SANITARY

Columbia Engineering Service Co., San Francisco, Calif. (magnetic trap for tramp iron removal)
Duriron Co., Inc., The, Dayton, O. (corrosion resisting)
Tri-Clover Machine Co., Kenosha, Wis.

FITTINGS, PIPE, STAINLESS STEEL

Aircraft Fitting Co., Cleveland, O.
Alloy Steel Products Co., Linden, N. J.
Camco Products Inc., New Haven, Conn.
Cooper Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Electric Steel Foundry Co., Portland, Ore.
Flori Pipe Co., The, St. Louis, Mo.
●Globe Steel Tubes Co., Milwaukee, Wis.
●Ladish Co., Cudahy, Wis.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
●Taylor Forge & Pipe Wks., Chicago, Ill.
Tri-Clover Machine Co., Kenosha, Wis.
Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.
Welding Fittings Corp., New Castle, Pa.

FITTINGS, PIPE, STEEL, FLANGED

Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
●Bonney Forge & Tool Works, Allentown, Pa.
●Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
●Frick Co., Waynesboro, Pa.
Kerotest Mfg. Co., Pittsburgh, Pa.
Michigan Pipe Co., Bay City, Mich.
National Valve & Mfg. Co., Pittsburgh, Pa.
Naylor Pipe Co., Chicago, Ill.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Semet-Solvay Engrg Div., Allied Chemical & Dye Corp., New York, N. Y.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.

FITTINGS, PIPE, STEEL, FORGED, THREADED

Bonney Forge & Tool Works, Allentown, Pa.
Capitol Mfg. & Supply Co., Columbus, O.
Catawissa Valve & Fittings Co., Catawissa, Pa.
●Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
●Henry Valve Co., Melrose Park, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
●Ladish Co., Cudahy, Wis.
Larkin Packer Co., St. Louis, Mo.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

FITTINGS, PIPE, STEEL, SOCKET WELD

Bonney Forge & Tool Works, Allentown, Pa.
Catawissa Valve & Fittings Co., Catawissa, Pa.
●Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
●Ladish Co., Cudahy, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

FITTINGS, PIPE, STEEL, THREADED

Bonney Forge & Tool Works, Allentown, Pa.
Capitol Mfg. & Supply Co., Columbus, O.
Catawissa Valve & Fittings Co., Catawissa, Pa.
●Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
Gustin Bacon Mfg. Co., Kansas City, Mo.
Harrisburg Steel Corp., Harrisburg, Pa.
Hasco Valve & Machine Co., Milwaukee, Wis.
●Ladish Co., Cudahy, Wis.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Tubing Seal-Cap, Inc., Los Angeles, Calif. (plugs and caps)
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

FITTINGS, PIPE, STEEL, WELDING

Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
Bonney Forge & Tool Works, Allentown, Pa.
Catawissa Valve & Fittings Co., Catawissa, Pa.
Cooper Alloy Foundry Co., The, Hillside, N. J. (stainless)
●Crane Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Flori Pipe Co., The, St. Louis, Mo.
●Globe Steel Tubes Co., Milwaukee, Wis.
●Grinnell Co., Inc., Providence, R. I.
Gustin Bacon Mfg. Co., Kansas City, Mo.
●Ladish Co., Cudahy, Wis.
Larkin Packer Co., St. Louis, Mo.
Lumsden & Van Stone Co., Div. of Midwest Piping & Supply Co., South Boston, Mass.
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Naylor Pipe Co., Chicago, Ill.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
●Taylor Forge & Pipe Wks., Chicago, Ill.
Tri-Clover Machine Co., Kenosha, Wis. (stainless steel)
Tube Turns, Inc., Louisville, Ky.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Welding Fittings Corp., New Castle, Pa.

FITTINGS, PIPE, WROUGHT IRON, WELDING

Bonney Forge & Tool Works, Allentown, Pa.
Flori Pipe Co., The, St. Louis, Mo.
Gustin Bacon Mfg. Co., Kansas City, Mo.
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
●Taylor Forge & Pipe Wks., Chicago, Ill.

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Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York, N. Y.

FITTINGS, REFRIGERATION

Aero-Coupling Corp., Burbank, Calif.
Aeroquip Corp., Jackson, Mich.
Aminco Refrigeration Products Co., Detroit, Mich.
Baker Refrigeration Corp., South Windham, Me.
Chase Brass & Copper Co., Waterbury, Conn.
Commonwealth Brass Corp., Detroit, Mich.
●Crane Co., Chicago, Ill.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
●Frick Co., Waynesboro, Pa.
Hays Mfg. Co., Erie, Pa.
●Henry Valve Co., Melrose Park, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
●Ladish Co., Cudahy, Wis.
Madden Brass Products Co., The, Chicago, Ill.
●Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
Remco, Inc., Zelienople, Pa.
Scovill Mfg. Co., Brass Goods Div., Waterville, Conn.
Superior Valve & Fittings Co., Pittsburgh, Pa.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
Wabash Mfg. Co., Chicago, Ill.
Watson-Stillman Co., Roselle, N. J.
Weatherhead Co., Cleveland, O.
Wittenmeier Machinery Co., Chicago, Ill.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Inc., Chicago, Ill.
York Corp., York, Pa.

FITTINGS, STEEL TUBE, FLARED OR FLARELESS

Aircraft Fitting Co., Cleveland, O.
Couplings Co., Chicago, Ill.
●Grinnell Co., Inc., Providence, R. I.
Imperial Brass Mfg. Co., Chicago, Ill.
Parker Appliance Co., The, Cleveland, O.
Weatherhead Co., The, Cleveland, O.
York Corp., York, Pa.

FLAME CONTROLS

See Controls, Flame Failure

FLANGE BOLTS

See Bolts and Studs, Flange

FLANGE SEPARATORS

See Separators, Flange

FLANGES, ORIFICE

Altena Foundry & Machine Works, Inc., Lancaster, O.
Barton Instrument Corp., Los Angeles, Calif.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Conoflow Corp., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
Foxboro Co., Foxboro, Mass.
●Grinnell Co., Inc., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis.
●Ladish Co., Cudahy, Wis.
Madden & Co., P. E., Chicago, Ill.
Meriam Instrument Co., The, Cleveland, O.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
●Taylor Forge & Pipe Wks., Chicago, Ill.
Trimount Instrument Co., Chicago, Ill.
Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York, N. Y.

FLANGES, PIPE, ALLOY STEEL, LAP JOINT

Alloy Steel Products Co., Linden, N. J.
Cooper Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Electric Steel Foundry Co., Portland, Ore.
Flori Pipe Co., The, St. Louis, Mo.
●Globe Steel Tubes Co., Milwaukee, Wis.
●Grinnell Co., Inc., Providence, R. I.
Harrisburg Steel Corp., Harrisburg, Pa.
Hasco Valve & Machine Co., Milwaukee, Wis.
●Ladish Co., Cudahy, Wis.
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
●Taylor Forge & Pipe Works, Chicago, Ill.
Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York, N. Y.

FLANGES, PIPE, ALLOY STEEL, SCREWED

Alloy Steel Products Co., Linden, N. J.
Camco Products Inc., New Haven, Conn.
Cooper Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Electric Steel Foundry Co., Portland, Ore.
Flori Pipe Co., The, St. Louis, Mo.
●Globe Steel Tubes Co., Milwaukee, Wis.
●Grinnell Co., Inc., Providence, R. I.
Harrisburg Steel Corp., Harrisburg, Pa.
Hasco Valve & Machine Co., Milwaukee, Wis.
●Ladish Co., Cudahy, Wis.
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
●Taylor Forge & Pipe Works, Chicago, Ill.
Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

FLANGES, PIPE, ALLOY STEEL, WELDING

Camco Products Inc., New Haven, Conn.
Cooper Alloy Foundry Co., Hillside, N. J.
●Crane Co., Chicago, Ill.
Electric Steel Foundry Co., Portland, Ore.
Flori Pipe Co., The, St. Louis, Mo.
●Globe Steel Tubes Co., Milwaukee, Wis.
●Grinnell Co., Inc., Providence, R. I.
Harrisburg Steel Corp., Harrisburg, Pa.
Hasco Valve & Machine Co., Milwaukee, Wis.
●Ladish Co., Cudahy, Wis.
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
●Taylor Forge & Pipe Works, Chicago, Ill.
Tube Turns, Inc., Louisville, Ky.
●Walworth Co., New York, N. Y.
Welding Fitttings Corp., New Castle, Pa.

FLANGES, PIPE, BRASS, SCREWED

Acheson Mfg. Co., Rankin, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Conoflow Corp., Philadelphia, Pa.
●Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Providence, R. I.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
●Ladish Co., Cudahy, Wis.
National Valve & Mfg. Co., Pittsburgh, Pa.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
Quaker City Iron Wks., Philadelphia, Pa.
Ritter Pattern & Casting Co., New York, N. Y.
Union Metal Works, Chelsea, Mass.
●Walworth Co., New York, N. Y.

FLANGES, PIPE, CAST IRON, SCREWED

Altena Foundry & Machine Works, Inc., Lancaster, O.
Clow & Sons, James B., Chicago, Ill.
●Crane Co., Chicago, Ill.
Detroit Brass & Malleable Works, Detroit, Mich.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
●Grinnell Co., Inc., Providence, R. I.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kuhns Bros. Co., Dayton, O.
Lynchburg Foundry Co., Lynchburg, Va.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
Ravena Iron Co., Ravena, N. Y.
Ritter Pattern & Casting Co., New York, N. Y.
Semler Co., Jeannette, Pa.
Stockham Valves & Fittings, Birmingham, Ala.
Straight Line Foundry & Machine Corp., Direct Separator Div., Syracuse, N. Y.
U. S. Plug & Fitting Co., Cleveland, O.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
Warren Foundry & Pipe Corp., New York, N. Y.

FLANGES, PIPE, MALLEABLE IRON, SCREWED

Baker Refrigeration Corp., South Windham, Me.

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●Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
●Jefferson Union Co., New York, N. Y.
National Valve & Mfg. Co., Pittsburgh, Pa.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
●Walworth Co., New York, N. Y.

FLANGES, PIPE, NICKEL AND NICKEL ALLOY

Cooper Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Electric Steel Foundry Co., Portland, Ore.
Flori Pipe Co., The, St. Louis, Mo.
Hasco Valve & Machine Co., Milwaukee, Wis.
International Nickel Co., Inc., The, New York, N. Y.
●Ladish Co., Cudahy, Wis.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
●Taylor Forge & Pipe Wks., Chicago, Ill.
Tri-Clover Machine Co., Kenosha, Wis.
●Walworth Co., New York, N. Y.

FLANGES, PIPE, STEEL, LAP JOINT

Chicago Metal Mfg. Co., Chicago, Ill.
●Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
●Globe Steel Tubes Co., Milwaukee, Wis.
●Grinnell Co., Inc., Providence, R. I.
Harrisburg Steel Corp., Harrisburg, Pa.
●Ladish Co., Cudahy, Wis.
Lumsden & Van Stone Co., Div. of Midwest Piping & Supply Co., South Boston, Mass.
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
●Taylor Forge & Pipe Works, Chicago, Ill.
Tube Turns, Inc., Louisville, Ky.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.

FLANGES, PIPE, STEEL, SCREWED

●Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
●Frick Co., Waynesboro, Pa.
G & H Mfg. Co., Philadelphia, Pa.
●Globe Steel Tubes Co., Milwaukee, Wis.
Harrisburg Steel Corp., Harrisburg, Pa.
●Henry Valve Co., Melrose Park, Ill.
Hubbell Corp., Mundelein, Ill.
●Ladish Co., Cudahy, Wis.
Lumsden & Van Stone Co., Div. of Midwest Piping & Supply Co., South Boston, Mass.
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
●Taylor Forge & Pipe Works, Chicago, Ill.
Tube Turns, Inc., Louisville, Ky.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

FLANGES, PIPE, STEEL, WELDING

Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
Atlantic Steel Co., Atlanta, Ga.
Bonney Forge & Tool Works, Allentown, Pa.
●Crane Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Flori Pipe Co., The, St. Louis, Mo.
●Globe Steel Tubes Co., Milwaukee, Wis.
●Grinnell Co., Inc., Providence, R. I.
Harrisburg Steel Corp., Harrisburg, Pa.
●Henry Valve Co., Melrose Park, Ill.
Hubbell Corp., Mundelein, Ill.
●Ladish Co., Cudahy, Wis.
Lumsden & Van Stone Co., Div. of Midwest Piping & Supply Co., South Boston, Mass.
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
National Valve & Mfg. Co., Pittsburgh, Pa.
Naylor Pipe Co., Chicago, Ill.
Pennsylvania Forge Co., Philadelphia, Pa.
Phoenix Mfg. Co., Joliet, Ill.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Power Piping Div., Blaw Knox Co., Pittsburgh, Pa.
Roessing Mfg. Co., Pittsburgh, Pa.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
●Taylor Forge & Pipe Works, Chicago, Ill.
Tube Turns, Inc., Louisville, Ky.
Vilter Mfg. Co., Milwaukee, Wis.
U. S. Plug & Fitting Co., Cleveland, O.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

FLARED FITTINGS, COPPER TUBE

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FLARED FITTINGS, STEEL TUBE

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FLARING TOOLS FOR TUBING

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FLEXIBLE COUPLINGS

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FLEXIBLE DUCT CONNECTIONS

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FLEXIBLE METAL HOSE

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FLOAT SWITCHES

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FLOAT VALVES

See Valves, Float

FLOATS, STEAM TRAP, ETC.

●Armstrong Machine Wks., Three Rivers, Mich.
Bailey Co., Chas. M., San Francisco, Calif.
Chicago Float Works, Inc., Chicago, Ill.
●Crane Co., Chicago, Ill.
Cryer Trap & Valve Co., Inc., New York, N. Y.
Harris & Co., Arthur, Chicago, Ill.
●Hoffman Specialty Co., Indianapolis, Ind.
Kieley & Mueller, Inc., North Bergen, N. J.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Naugatuck Mfg. Co., Union City, Conn.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
Owens & Co., Inc., Henry, Cranston, R. I.
Reichert Float & Mfg. Co., Toledo, O.
Reliance Gauge Column Co., Cleveland, O.
Sterling Engineering Mfg. Corp., Hyde Park, Mass.
●Swartwout Co., Cleveland, O.
●Trane Co., The, La Crosse, Wis.
Vapor Specialty Co., New York, N. Y.
Watson & McDaniel Co., Philadelphia, Pa.
Williams Gauge Co., The, Pittsburgh, Pa.

FLOOR AND CEILING PLATES

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FLOW CONTROL VALVES

See Valves, Flow Control

FLOW METERS

See Meters, Flow

FLOW SWITCHES

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FORGED STEEL VALVES

See Valves, Forged Steel

FRESHENERS, AIR

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FUEL ECONOMIZERS

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FUEL OIL UNITS

See Units, Fuel Oil

FURNACES, DUCT

See Heaters, Duct

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FURNACES, WARM AIR, FOR INDUSTRIAL AND LARGE BUILDING CENTRAL HEATING

(Exclusively for duct distribution of air—300,000 Btu per hr and over) For direct fired heaters, which may be located in the space heated or may be used in central plant installations with duct distribution of the air, see the listings under Heaters, Air, Direct Fired.

Aladdin Heating Corp., Oakland, Calif.
American Foundry & Furnace Co., Bloomington, Ill.
Arcweld Mfg. Co., Inc., Seattle, Wash.
Beck Engineering Combustion Kompany, St. Louis, Mo.
●Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
Campbell Co., E. K., Kansas City, Mo.
●Campbell Heating Co., Des Moines, Ia.
●Century Engineering Corp., Cedar Rapids, Ia.
Certified Furnace Co., Div. Stainless & Steel Products Co., St. Paul, Minn.
Hess Co., The, Chicago, Ill.
International Sales Co., San Francisco, Calif.
●Jackson & Church Co., Saginaw, Mich.
Lee Engineering Co., Hoboken, N. J.
Lennox Furnace Co., Columbus, O.
MaGirl Foundry & Furnace Co., Bloomington, Ill.
McPherson Furnace & Supply Co., Portland, Ore.
Meyer Furnace Co., The, Peoria, Ill.
●Mueller Furnace Co., L. J., Milwaukee, Wis.
●National Heater Co., St. Paul, Minn.
●Olson & Co., Arthur A., Canfield, O.
Pennsylvania Furnace & Iron Co., Warren, Pa.
●Ray Oil Burner Co., San Francisco, Calif.
Rosebraugh Co., W. W., Salem, Ore.
Surface Combustion Corp., Toledo, O.
Syncromatic Corp., Watertown, Wis.

FUSIBLE LINKS

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GAGE GLASSES

See Glasses, Gage

GAGE TESTERS

See Testers, Gage, Dead Weight

GAGES, AIR FILTER

Defender Instrument and Regulator Co., St. Louis, Mo.
Dwyer Mfg. Co., F. W., Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
●Hays Corp., Michigan City, Ind.
Herbusch Corp., The, St. Louis, Mo. (Warning device)
Hill, E. Vernon, Chicago, Ill.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Meriam Instrument Co., The, Cleveland, O.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.

GAGES, INDICATING, DRAFT

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Canton Stoker Corp., Canton, O.
●Cleveland Fuel Equipment Co., Cleveland, O.
Cole-Sewell Engineering Co., St. Paul, Minn.
Defender Instrument and Regulator Co., St. Louis, Mo.
Dwyer Mfg. Co., F. W., Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
General Blower Co., Inc., Philadelphia, Pa.
●Hays Corp., Michigan City, Ind.
Hill, E. Vernon & Co., Chicago, Ill.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Illinois Testing Laboratories, Inc., Chicago, Ill.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Meriam Instrument Co., The, Cleveland, O.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
●Perfex Corp., Milwaukee, Wis.
Precision Scientific Co., Chicago, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.

GAGES, INDICATING, PRESSURE

Ashton Valve Co., Wrentham, Mass.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Bristol Co., The, Waterbury, Conn.
Canton Stoker Corp., Canton, O.
Clapp Instrument Co., Webster, Mass.
●Cleveland Fuel Equipment Co., Cleveland, O.
Crosby Steam Gage & Valve Co., Wrentham, Mass.
Defender Instrument and Regulator Co., St. Louis, Mo.
●Dole Valve Co., The, Chicago, Ill.
Dwyer Mfg. Co., F. W., Chicago, Ill.
Electro Products Laboratories, Inc., Chicago, Ill.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Garden City Instruments, Inc., Chicago, Ill.
General Blower Co., Inc., Philadelphia, Pa.
Giannini & Co., Inc., G. M., Pasadena, Calif.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
●Hays Corp., Michigan City, Ind.
Helicoid Gage Div., American Chain & Cable Co., Inc., Bridgeport, Conn.
●Hoffman Specialty Co., Indianapolis, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Keller Tool Co., Grand Haven, Mich.
Lonergan Co., J. E., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
●Marsh Corp., Jas. P., Skokie, Ill.
Marshalltown Mfg. Co., Marshalltown, Ia.
Meriam Instrument Co., The, Cleveland, O.
●Mettler Co., Inc., The, Los Angeles, Calif.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
Modern Engineering Co., St. Louis, Mo.
Mouat Vapor Heating Co., The, Cleveland, O.
New York Air Valve Corp., Brooklyn, N. Y.
Norgren Co., C. A., Denver, Colo.
Norwalk Valve Co., South Norwalk, Conn.
●Perfex Corp., Milwaukee, Wis.
Preferred Utilities Mfg. Corp., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Rochester Mfg. Co., Rochester, N. Y.
Scientific Instrument Co., Detroit, Mich.
Stewart-Warner Corp., Heating Div., Indianapolis, Ind.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Taylor Instrument Companies, Rochester, N. Y.
●Thrush & Co., H. A., Peru, Ind.
Trerice Co., H. O., Detroit, Mich.
Trimount Instrument Co., Chicago, Ill.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Uehling Instrument Co., Paterson, N. J.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
Watson-Stillman Co., Roselle, N. J.
Weksler Thermometer Corp., New York, N. Y.

GAGES, INDICATING, VACUUM

Ashton Valve Co., Wrentham, Mass.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Bristol Co., The, Waterbury, Conn.
Clapp Instrument Co., Webster, Mass.
Crosby Steam Gage Valve Co., Wrentham, Mass.
Defender Instrument and Regulator Co., St. Louis, Mo.
●Dole Valve Co., The, Chicago, Ill.
●Dwyer Mfg. Co., F. W., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
Giannini & Co., Inc., G. M., Pasadena, Calif.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Hastings Instrument Co., Hampton, Va.
●Hays Corp., Michigan City, Ind.
Helicoid Gage Div., American Chain & Cable Co., Inc., Bridgeport, Conn.
Hill, E. Vernon & Co., Chicago, Ill.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Lonergan Co., J. E., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
●Marsh Corp., Jas. P., Skokie, Ill.
Marshalltown Mfg. Co., Marshalltown, Ia.
Meriam Instrument Co., The, Cleveland, O.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Mouat Vapor Heating Co., The, Cleveland, O.
Norwalk Valve Co., South Norwalk, Conn.
Preferred Utilities Mfg. Corp., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Rochester Mfg. Co., Rochester, N. Y.
Scientific Instrument Co., Detroit, Mich.
Skaneateles Mfg. Co., Inc., Syracuse, N. Y.
Stewart-Warner Corp., Heating Div., Indianapolis, Ind.
Stokes Machine Co., F. J., Philadelphia, Pa.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Trimount Instrument Co., Chicago, Ill.

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Uehling Instrument Co., Paterson, N. J.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
Wallace & Tiernan, Inc., Newark, N. J.
Weksler Thermometer Corp., New York, N. Y.

GAGES, LIQUID LEVEL

Alloy Steel Products Co., Linden, N. J. (Stainless steel)
American Injector Co., Detroit, Mich.
Applied Mechanics Co., Boston, Mass.
Automatic Control Co., St. Paul, Minn.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Barton Instrument Corp., Los Angeles, Calif.
Bearlee Products Co., Green Bay, Wis.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Bostcn Auto Gage Co., Pittsfield, Mass.
Bristol Co., The, Waterbury, Conn.
Caldwell Co., W. E., Louisville, Ky.
Crosby Steam Gage & Valve Co., Wrentham, Mass.
Defender Instrument and Regulator Co., St. Louis, Mo.
Detroit Brass & Malleable Works, Detroit, Mich.
Diamond Power Specialty Corp., Lancaster, O.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Giannini & Co., Inc., G. M., Pasadena, Calif.
●Hays Corp., Michigan City, Ind.
●Henry Valve Co., Melrose Park, Ill.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Keckley Co., O. C., Chicago, Ill.
King Engineering Corp., Ann Arbor, Mich.
Klingerite, Inc., New York, N. Y.
Krueger Sentry Gauge Co., Green Bay, Wis.
Liquidepth Indicators, Inc., Long Island City, N. Y.
Liquidometer Corp., Long Island City, N. Y.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
Marshalltown Mfg. Co., Marshalltown, Ia.
McAlear Mfg. Co., Chicago, Ill.
Mel-Gauge Co., East Haven, Conn.
Mel Products Co., The, New Haven, Conn.
Meriam Instrument Co., The, Cleveland, O.
●Mettler Co., Inc., The, Los Angeles, Calif.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moore Products Co., Philadelphia, Pa.
Morse-Smith-Morse, Inc., Watertown, Mass.
Nason Co., Detroit, Mich.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
Oil Equipment Mfg. Corp., New Haven, Conn.
Penberthy Injector Co., Detroit, Mich.
Petrometer Corp., Long Island City, N. Y.
Powell Co., Wm., Cincinnati, O.
Reliance Gauge Column Co., Cleveland, O.
Republic Flow Meters Co., Chicago, Ill.
Rochester Mfg. Co., Rochester, N. Y.
Scientific Instrument Co., Detroit, Mich.
Stewart-Warner Corp., Heating Div., Indianapolis, Ind.
Swift Lubricator Co., Elmira, N. Y.
●Taylor Instrument Companies, Rochester, N. Y.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
Wallace & Tiernan Co., Newark, N. J.
Williams Gauge Co., The, Pittsburgh, Pa. (Water)
Wright-Austin Co., Detroit, Mich.
●Yarnall-Waring Co., Philadelphia, Pa.

GAGES, OIL TANK

Boston Auto Gage Co., Pittsfield, Mass.
Crosby Steam Gage & Valve Co., Wrentham, Mass.
King Engineering Corp., Ann Arbor, Mich.
Krueger Sentry Gauge Co., Green Bay, Wis.
Liquidepth Indicators, Inc., Long Island City, N. Y.
Liquidometer Corp., Long Island City, N. Y.
Penberthy Injector Co., Detroit, Mich.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Scully Signal Co., Cambridge, Mass.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.
Viking Pump Co., Cedar Falls, Ia.

GALVANIZED SHEETS

See Sheets, Steel, Galvanized

GALVANNEALED SHEETS

See Sheets, Steel, Galvannealed

GAS BURNERS

See Burners, Gas

GAS ENGINES

See Engines, Gas

GAS FIRED RADIATORS

See Radiators, Gas Fired

GAS PRESSURE REGULATORS

See Regulators, Pressure, Gas

GAS VENT AND FLUE PIPE

See Pipe and Fittings, Gas Vent and Flue

GAS VOLUME METERS

See Meters, Volume, Air and Gas

GASKETS

Acadia Synthetic Products Div., Western Felt Works, Chicago, Ill. (Felt, rubber)
Acme Asbestcs Covering & Flooring Co., Chicago, Ill.
Akron Metallic Gasket Co., Akron, O.
Apha Metals, Inc., Brooklyn, N. Y.
American Felt Co., Glenville, Conn.
Anchor Packing Co., Philadelphia, Pa. (Asbestos)
●Armstrong Cork Co., Lancaster, Pa., (Cork & cork composition)
Austin-Mason Co., Everett, Mass.
Azor Corp., Irvington, N. J. (Spiral wound)
Baldwin Belting, Inc., New York, N. Y.
Belmont Packing & Rubber Co., Philadelphia, Pa.
Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y. (Lead)
Chase Brass & Copper Co., Waterbury, Conn. (Brass and copper)
Chicago-Wilcox Mfg. Co., Chicago, Ill.
Clow & Sons, James B., Chicago, Ill.
Continental-Diamond Fibre Co., Newark, Del.
Continental Rubber Wks., Erie, Pa.
●Crane Co., Chicago, Ill.
Darcoid Co., Inc., New York, N. Y. (Asbestos)
Durabla Mfg. Co., New York, N. Y. (Asbestos fibre)
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Endura Mfg. Corp., Quakertown, Pa. (Paper, fibre)
Excelsior Leather Washer Mfg. Co., Rockford, Ill.
Federated Metal Div., American Smelting & Refining Co., New York, N. Y.
Felt Products Mfg. Co., Chicago, Ill. (Heat and oil resisting)
Felters Company, The, Boston, Mass.
Flexitallic Gasket Co., Camden, N. J. (Metal, asbestos)
Flexlock Corp., Akron, O.
Garlock Packing Co., Palmyra, N. Y.
Gates Rubber Co., The, Denver, Colo.
Gatke Corp., Chicago, Ill.
General Electric Co., Chemical Dept., Pittsfield, Mass.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
●Grant Wilson Inc., Chicago, Ill. (asbestos)
Graton & Knight Co., Worcester, Mass. (Leather)
Greene, Tweed & Co., North Wales, Pa.
Houghton & Co., E. F., Philadelphia, Pa. (Leather)
Johns-Manville, New York, N. Y.
Klingerit, Inc., New York, N. Y.
Linear Incorporated, Philadelphia, Pa.
Metallo Gasket Co., New Brunswick, N. J. (Metal, metal asbestos)
Mortell Co., J. W., Kankakee, Ill.
National Engineering Products, Inc., Washington, D. C. (Plastic)
National Lead Co., New York, N. Y. (lead)
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Products Research Co., Los Angeles, Calif.
Quaker Rubber Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Passaic, N. J. (Rubber and asbestos)
Resistoflex Corp., Belleville, N. J.
Rubatex Div., Great American Industries, Inc., Bedford, Va.
Schieren Co., Chas. A., New York, N. Y.
Smooth-On Mfg. Co., Jersey City, N. J. (Corrugated iron)
Sponge Rubber Products Co., Shelton, Conn.
Steel Improvement & Forge Co., Cleveland, O.
Stokes Molded Products, Inc., Trenton, N. J. (Hard rubber)
Technical Ply-Woods, Chicago, Ill.
Thermoid Co., Trenton, N. J.
●Union Asbestos & Rubber Co., Cicero, Ill.
United States Gasket Co., Camden, N. J.
United States Rubber Co., New York, N. Y. (Rubber, asbestos)
United States Stoneware Co., New York, N. Y.
Western Felt Wks., Chicago, Ill. (Felt)
Zimmerman Packing Co., Cincinnati, O. (also gasket cutters)

GASOLINE FIRED HEATERS

See Heaters, Gasoline Fired

GATES, BLAST

Allington & Curtis Mfg. Co., Saginaw, Mich.
Bayley Blower Co., Milwaukee, Wis.
Berger Bros., Co., Philadelphia, Pa.
●Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
●Clarage Fan Co., Kalamazoo, Mich.
Day Co., The, Minneapolis, Minn.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Goethel Sheet Metal Works, Alfred, Milwaukee, Wis.
Kirk & Blum Mfg. Co., Cincinnati, O.
Maysteel Products, Inc., Milwaukee, Wis.
Newcomb-Detroit Co., Detroit, Mich.

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Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
Rockwell Co., W. S., Fairfield, Conn.
Spencer Turbine Co., Hartford, Conn.
Thermix Corp., The, Greenwich, Conn.
Western Blower Co., Seattle, Wash.
Winkler & Sons, Inc., A. E., Milwaukee, Wis.

GLASS, HEAT ABSORBING

See Windows, Heat Insulating

GLASS PIPE

See Pipe, Glass

GLASSES, GAGE

Bache, Semon & Co., New York, N. Y.
Chicago Specialty Mfg. Co., Chicago, Ill.
Corning Glass Works, Corning, N. Y.
Daigger & Co., A., Chicago, Ill.
Defender Instrument & Regulator Co., St. Louis, Mo.
Detroit Brass & Malleable Works, Detroit, Mich.
Diamond Power Specialty Corp., Lancaster, O.
●Henry Valve Co., Melrose Park, Ill.
Klingerit, Inc., New York, N. Y.
Libbey-Owens-Ford Glass Co., Toledo, O.
Lunkenheimer Co., Cincinnati, O.
New York Air Valve Corp., Brooklyn, N. Y.
Penberthy Injector Co., Detroit, Mich.
Reliance Gauge Column Co., Cleveland, O.
●Sarco Co., Inc., New York, N. Y.
Swift Lubricator Co., Elmira, N. Y.

GLASSES, SIGHT, FOR PIPE LINES

●American District Steam Co., North Tonawanda, N. Y.
Bowser, Inc., Fort Wayne, Ind.
Cochrane Corp., Philadelphia, Pa.
Corning Glass Works, Corning, N. Y.
Fischer & Porter Co., Hatboro, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
Libbey-Owens-Ford Glass Co., Toledo, O.
●Mueller Brass Co., Port Huron, Mich.
O P W Corp., Cincinnati, O.
Penberthy Injector Co., Detroit, Mich.
Powell Co., Wm., The, Cincinnati, O.
Remco, Inc., Zelienople, Pa. (for refrigerant lines)
Schutte & Koerting Co., Philadelphia, Pa.
Superior Valve & Fittings Co., Pittsburgh, Pa.
Swift Lubricator Co., Elmira, N. Y.
Weatherhead Co., Cleveland, O.
●Webster & Co., Warren, Camden, N. J.

GLOBE VALVES

See Valves, Globe

GLYCOL VAPORIZERS

See Units, Sterilizing, Air

GOVERNORS, PUMP

Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Boylston Steam Specialty Co., Chicago, Ill.
Burrows Mfg. Co., F. A., York, Pa.
●Cash Co., A. W., Decatur, Ill.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
Hagan Corp., Pittsburgh, Pa.
Keckley Co., O. C., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Locke Regulator Co., Salem, Mass.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Northern Equipment Div., Continental Foundry & Machine Co., Erie, Pa.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
Schade Valve Mfg. Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
●Spence Engineering Co., Inc., Walden, N. Y.
Squires Co., C. E., Cleveland, O.
Staples & Pfeiffer, San Francisco, Calif.
●Swartwout Co., Cleveland, O.
Watson & McDaniel Co., Philadelphia, Pa.
●Webster & Co., Warren, Camden, N. J.
Williams Gauge Co., The, Pittsburgh, Pa.

GRILLES

See also Diffusers; Panels, Perforated, for Air Diffusion; Registers

A & A. Register Co., Cleveland, O.
●A-J Mfg. Co., Kansas City, Mo.
Acme Mfg. Co., Holmesburg, Philadelphia, Pa.
Air Control Products, Inc., Coopersville, Mich.
Alton Mfg. Co., Dallas, Tex.
American Foundry & Furnace Co., Bloomington, Ill.
American Warming & Ventilating Co., Toledo, O.
●Auer Register Co., Cleveland, O.
Bahnson Co., Winston-Salem, N. C.
Barber-Colman Co., Rockford, Ill.
Beckley Perforating Co., Garwood, N. J.
Best Register Co., Milwaukee, Wis.
Central Wire & Iron Works, Des Moines, Ia.
Char-Gale Mfg. Co., Minneapolis, Minn.
Controlair Mfg. Co., Los Angeles, Calif.
Crown Iron Works, Minneapolis, Minn.
Decatur Iron & Steel Co., Decatur, Ala.
Diamond Mfg. Co., Wyoming, Pa.
Empire Ventilation Equipment Co., Long Island City, N. Y.
Erdle Perforating Co., Rochester, N. Y.
●Harrington & King Perforating Co., Chicago, Ill.
Hart & Cooley Mfg. Co., Holland, Mich.
Hendrick Mfg. Co., Carbondale, Pa.
●Independent Register Co., Cleveland, O.
Jamieson Mfg. Co., Dallas, Tex.
Johnston & Chapman Co., Chicago, Ill.
Lima Register Co., The, Lima, O.
Lockjoint Wood Products Co., Wichita, Kans. (Wood)
Manhattan Perforated Metal Co., Inc., Long Island City, N. Y.
Metal Carrier Corp., Grand Rapids, Mich.
Midco Register Corp., St. Paul, Minn.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Mundt & Sons, Charles, Jersey City, N. J.
Palmer Mfg. Corp., Phoenix, Ariz.
●Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
Reliable Perforating Co., Chicago, Ill.
Rock Island Register Co., Rock Island, Ill.
Schoedinger, F. O., Columbus, O.
Smith Co., J. B., Philadelphia, Pa.
●Standard Stamping & Perforating Co., Chicago, Ill.
Stewart Mfg. Co., Inc., Cedar Grove, N. J.
●Titus Mfg. Corp., Waterloo, Iowa.
●Tuttle & Bailey, Inc., New Britain, Conn.
●United States Air Conditioning Corp., Minneapolis, Minn.
United States Register Co., Battle Creek, Mich.
Utility Appliance Corp., Los Angeles, Calif.
Viking Mfg. Corp., Cleveland, O.
Western Wire & Iron Works, Inc., Chicago, Ill. (metal)
Wickwire Spencer Steel, Div. of Colorado Fuel & Iron Corp., New York, N. Y.
Young Regulator Co., Cleveland, O.

GUNS AND POTS, SMOKE AND SMUDGE, FOR TESTING AIR MOVEMENT

Hill, E. Vernon & Co., Chicago, Ill.
Mine Safety Appliances Co., Pittsburgh, Pa.
●Newman Co., Inc., I. C., New York, N. Y. (smoke containers)
Pains Fireworks Display Co., New York, N. Y.
Unexcelled Chemical Corp., New York, N. Y.

HAND SHEARS

See Shears and Snips, Hand

HANGERS OR BRACKETS, RADIATOR

●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Arjac Products, Inc., Rochester, N. Y.
●Bell & Gossett Co., Morton Grove, Ill.
Carpenter & Paterson, Inc., East Boston, Mass.
Carty & Moore Engineering Co., Detroit, Mich.
●Crane Co., Chicago, Ill.
Crawford Co., Chicago, Ill.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
●Grinnell Co., Inc., Providence, R. I.
Hartmann Co., Chas., Brooklyn, N. Y.
Healy Ruff Co., St. Paul, Minn.
Jennison Co., Fitchburg, Mass. (Adjustable radiator foot rest)
National Radiator Co., The, Johnstown, Pa.
Power Piping Div., Blaw-Knox Co., Pittsburgh, Pa.
Unistrut Products Co., Chicago, Ill.
United States Radiator Corp., Detroit, Mich.
Western Hanger Co., San Francisco, Calif.

HANGERS AND SUPPORTS, DUCT

Acme Mfg. Co., Philadelphia, Pa.
Hexdall Co., A. M., Morris, Ill.
Moore Inc., Goodloe E., Danville, Ill.
Powder Power Tool Corp., Portland, Ore.
Standard Furnace Supply Co., Omaha, Neb.
●Ramset Fasteners, Inc., Cleveland, O.
United Industries, Madison, Wis. (for use with precast concrete joists)
Unistrut Products Co., Chicago, Ill.

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HANGERS AND SUPPORTS, PIPE

●American District Steam Co., North Tonawanda, N. Y.
Atlantic Steel Co., Atlanta, Ga.
Carpenter & Paterson, Inc., East Boston, Mass.
Crawford Co., Chicago, Ill.
Farley Sleeve & Hanger Co., Cleveland, O.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
●Frick Co., Waynesboro, Pa.
G & H Mfg. Co., Philadelphia, Pa. (hook)
General Fittings Co., Providence, R. I. (strap hangers)
Genspring, Inc., New York, N. Y.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
Hupp Corp., Globe Stamping Div., Cleveland, O.
Iwan Brothers, Inc., South Bend, Ind.
Korfund Co., Inc., Long Island City, N. Y.
Kynex Co., New York, N. Y. (for radiant heating)
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
Minerallac Electric Co., Chicago, Ill.
Moore Inc., Goodloe E., Danville, Ill.
National Valve & Mfg. Co., Pittsburgh, Pa.
Paine Co., Chicago, Ill.
Piping Specialties, Inc., New York, N. Y. (anchor and guide for expansion joints)
Powder Power Tool Corp., Portland, Ore.
●Ramset Fasteners, Inc., Cleveland, O. (conduit clips)
Ravena Iron Co., Ravena, N. Y. (hook plates)
Reintjes Co., Geo. P., Kansas City, Mo.
●Ric-wiL Co., Cleveland, O.
Ritter Pattern & Casting Co., New York, N. Y. (jack type adjustable tunnel stanchion)
Rockwood Sprinkler Co., Worcester, Mass.
Roessing Mfg. Co., Pittsburgh, Pa.
Russell Mfg. Co., John M., Naugatuck, Conn.
Titchener, E. H. & Co., Binghamton, N. Y. (wire staples for copper & brass tubing)
Truscon Steel Co., Youngstown, O.
Unistrut Products Co., Chicago, Ill.
United Industries, Madison, Wis. (for use with precast concrete joists)
●Walworth Co., New York, N. Y.
Western Wire Products Co., St. Louis, Mo. (wire pipe hooks and perforated hanger iron)

HARD RUBBER PIPE AND FITTINGS

See Pipe, Hard Rubber; Fittings, Pipe, Hard Rubber

HEADERS, WELDED

●Acme Industries, Inc., Jackson, Mich.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Baker Refrigeration Corp., South Windham, Me.
Ball Welding Works, Inc., Oakland, Calif.
Chicago Nipple Mfg. Co., Cicero, Ill.
Clow & Sons, James B., Chicago, Ill.
Cobra Pipe & Coil Co., Inc., Elmwood, Conn.
Columbian Steel Tank Co., Kansas City, Mo.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Crane Co., Chicago, Ill.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
●Dravo Corp., Machinery Div., Pittsburgh, Pa.
Flori Pipe Co., The, St. Louis, Mo.
Fluor Corp., Ltd., The, Los Angeles, Calif.
●Frick Co., Waynesboro, Pa.
●Grinnell Co., Inc., Providence, R. I.
International Engineering Wks., Inc., Framingham, Mass.
Kellogg Co., M. W., The, New York, N. Y.
Lumsden & Van Stone Div. of Midwest Piping & Supply Co., South Boston, Mass.
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
Mitchell & Co., Inc., W. K., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
National Valve & Mfg. Co., Pittsburgh, Pa.
Naylor Pipe Co., Chicago, Ill.
Ohio Pipe Bending & Mach. Co., Cleveland, O.
●Patterson-Kelley Co., Inc., East Stroudsburg, Pa.
Philadelphia Pipe Bending Co., Philadelphia, Pa.
Pittsburgh Pipe Coil & Bending Co., Etna, Pa.
Pittsburgh Piping & Equipment Co., Pittsburgh, Pa.
Power Piping Div., Blaw-Knox Co., Pittsburgh, Pa.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa.
●Rempe Co., Chicago, Ill.
Richmond Engineering Co., Inc., Richmond, Va.
Roessing Mfg. Co., Pittsburgh, Pa.
Sales & Co., Murray W., Detroit, Mich.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
Shaw Co., Benjamin F., Wilmington, Del.
Shaw Kendall Engineering Co., Toledo, O.
Vilter Mfg. Co., Milwaukee, Wis.
Western Piping & Engineering Co., San Francisco, Calif.
Whitlock Mfg. Co., Hartford, Conn.

HEADS, EXHAUST, FOR PIPE LINES

Biggs Boiler Wks., Co., The, E. Akron, O.
Cochrane Corp., Philadelphia, Pa.
Dickinson, Aeolus, Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
Hoppes Mfg. Co., Inc., Springfield, O.
●Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
Wright-Austin Co., Detroit, Mich.

HEADS, SPRINKLER, FOR FIRE PROTECTION

●Grinnell Co., Inc., Providence, R. I.
Hodgman Mfg. Co., Taunton, Mass.
Raisler Corp., Grimes Sprinkler Div., New York, N. Y.
Rockwood Sprinkler Co., Worcester, Mass.

HEAT EXCHANGERS

See Chillers, Water; Condensers, Refrigerating; Exchangers, Heat; Surface, Cooling; Surface, Heating

HEAT PUMPS

See Units, Air Conditioning, Reverse Refrigeration Cycle
For Furnaces for Central Plant Installation EXCLUSIVELY for Duct Distribution of the Air, See the Listing Under Furnaces

HEATERS, AIR, DIRECT FIRED, COAL

For Furnaces for Central Plant Installation EXCLUSIVELY for Duct Distribution of the Air, See the Listing Under Furnaces

Campbell Co., E. K., Kansas City, Mo.
●Campbell Heating Co., Des Moines, Ia.
●Dravo Corp., Machinery Div., Pittsburgh, Pa.
●Johnson Heater Corp., Saugas, Mass.
Lee Engineering Co., Hoboken, N. J.
●National Heater Co., St. Paul, Minn.
●Olson & Co., Arthur A., Canfield, O.

HEATERS, AIR, DIRECT FIRED, GAS, CENTRIFUGAL FAN TYPE

●Airtherm Mfg. Co., St. Louis, Mo.
American Furnace Co., St. Louis, Mo.
Automatic Gas Equipment Co., Pittsburgh, Pa.
Campbell Co., E. K., Kansas City, Mo.
●Campbell Heating Co., Des Moines, Ia.
Chicago Steel Furnace Co., Chicago, Ill.
●Dravo Corp., Pittsburgh, Pa.
Drying Systems, Inc., Chicago, Ill.
●General Gas Light Co., Kalamazoo, Mich.
Hastings Air Conditioning Co., Inc., Hastings, Neb.
International Sales Co., San Francisco, Calif.
●Jackson & Church Co., Saginaw, Mich.
●Johnson Heater Corp., Saugas, Mass.
Kilbury Mfg. Co., Inc., Lawndale, Calif.
Lee Engineering Co., Hoboken, N. J.
●Mueller Furnace Co., L. J., Milwaukee, Wis.
Nat Corp., Kansas City, Mo.
●National Heater Co., St. Paul, Minn.
Newcomb-Detroit Co., Detroit, Mich.
Norman Products Co., Inc., Columbus, O.
●Olson & Co., Arthur A., Canfield, O.
●Prat-Daniel Corp., East Port Chester, Conn.
●Reznor Mfg. Co., Mercer, Pa.
Surface Combustion Corp., Toledo, O.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.
●Zink Co., John, Tulsa, Okla.

HEATERS, AIR, DIRECT FIRED, OIL, FLOOR TYPE

●Airtherm Mfg. Co., St. Louis, Mo.
Campbell Co., E. K., Kansas City, Mo.
Chicago Steel Furnace Co., Chicago, Ill.
●Dravo Corp., Machinery Div., Pittsburgh, Pa.
Drying Systems, Inc., Chicago, Ill.
Gilbert & Barker Mfg. Co., West Springfield, Mass.
●Johnson Heater Corp., Saugas, Mass.
Lee Engineering Co., Hoboken, N. J.
●National Heater Co., St. Paul, Minn.
●Olson & Co., Arthur A., Canfield, O.
●Prat-Daniel Corp., East Port Chester, Conn.
Ross Engineering Corp., J. O., New York, N. Y.

HEATERS, AIR, DIRECT FIRED, OIL, PORTABLE, FOR INDUSTRIAL SPACE HEATING

●National Heater Co., St. Paul, Minn.
●Olson & Co., Arthur A., Canfield, O.
●Prat-Daniel Corp., East Port Chester, Conn.

HEATERS, AIR, DIRECT FIRED, OIL, SUSPENDED TYPE

●Airtherm Mfg. Co., St. Louis, Mo.
Auburn Burner Co., Auburn, Ind.
American Furnace Co., St. Louis, Mo.

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Campbell Co., E. K., Kansas City, Mo.
Chicago Steel Furnace Co., Chicago, Ill.
●Dravo Corp., Machinery Div., Pittsburgh, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Gilbert & Barker Mfg. Co., West Springfield, Mass.
Harvey-Whipple, Inc., Springfield, Mass.
●Jackson & Church Co., Saginaw, Mich.
Lee Engineering Co., Hoboken, N. J.
●National Heater Co., St. Paul, Minn.
●Olson & Co., Arthur A., Canfield, O.
Overhead Heaters, Inc., Detroit, Mich.
●Prat-Daniel Corp., East Port Chester, Conn.
Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.

HEATERS, CONVECTION

See Radiation, Convection Type

HEATERS, DUCT, ELECTRIC

Brown Fintube Co., The, Elyria, O.
Consolidated Car-Heating Co., Inc., Albany, N. Y.
Despatch Oven Co., Minneapolis, Minn.
Electromode Corp., Rochester, N. Y.
Falcon Equipment Co., New Brighton, Pa.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Industrial Engineering & Equipment Co., St. Louis, Mo.
Kilbury Mfg. Co., Inc., Lawndale, Calif.
Martin-Quaid Co., Philadelphia, Pa.
Tenney Engineering, Inc., Newark, N. J.
Trent Inc., Philadelphia, Pa.
Vulcan Electric Co., Danvers, Mass.
●Wiegand Co., Edwin L., Pittsburgh, Pa.

HEATERS, DUCT, GAS

Allan Engineering Co., Dallas, Tex.
●Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
●General Gas Light Co., Kalamazoo, Mich.
Great National Air Conditioning Corp., Oklahoma City, Okla.
●Hayes Furnace & Mfg. Co., Inc., Los Angeles, Calif.
International Sales Co., San Francisco, Calif.
Kehm Corp., The, Chicago, Ill.
Meyer Furnace Co., The, Peoria, Ill.
Naco Mfg. Co., Huntington Park, Calif.
Norman Products Co., Inc., Columbus, O.
Palmer Mfg. Corp., Phoenix, Ariz.
Payne Furnace Div., Affiliated Gas Equipment, Inc., Monrovia, Calif.
●Reznor Mfg. Co., Mercer, Pa.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Surface Combustion Corp., Toledo, O.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.

HEATERS, FEEDWATER

See Deaerators

HEATERS, GASOLINE FIRED (FOR AIRCRAFT AND PORTABLE GROUND USE)

Drayer & Hanson, Inc., Los Angeles, Calif.
Fluid Heat Div., Anchor Post Products Inc., Baltimore, Md.
Stewart-Warner Corp., Heating Div., Indianapolis, Ind.
●Surface Combustion Corp., Toledo, O.

HEATERS, INDIRECT, SUBMERGED

●American District Steam Co., North Tonawanda, N. Y.
●Bell & Gossett Co., Morton Grove, Ill.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Brown Fintube Co., Elyria, O.
●Davis Engineering Corp., Elizabeth, N. J.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
General Fittings Co., Providence, R. I.
General Heaters & Regulators Co., Chicago, Ill.
Gerstein & Cooper Co., Inc., South Boston, Mass.
Graham Mfg. Co., Inc., New York, N. Y.
Lindy Heaters, Inc., New York, N. Y.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Penberthy Injector Co., Detroit, Mich.
Richmond Engineering Co., Inc., Richmond, Va.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
●Superior Combustion Industries, Inc., Detroit, Mich.
●Taco Heaters, Inc., Providence, R. I.
Western Blower Co., Seattle, Wash.
Yula Water Heaters, Inc., New York, N. Y.

HEATERS, OIL

See Preheaters, Fuel Oil: Units, Fuel Oil, Heating, Pumping and Straining

HEATERS, STEAM JET, FOR LIQUIDS

●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Duriron Co., Inc., The, Dayton, O.
Penberthy Injector Co., Detroit, Mich.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., Erie, Pa.

HEATERS, STRIP AND IMMERSION, ELECTRIC

American Instrument Co., Silver Spring, Md.
Consolidated Car-Heating Co., Inc., Albany, N. Y.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Falcon Equipment Co., New Brighton, Pa.
Fluid Systems, Inc., New Haven, Conn.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
H. & A. Co., Buffalo, N. Y.
Industrial Engineering & Equipment Co., St. Louis, Mo.
Martin-Quaid Co., Philadelphia, Pa.
Red Spot Electric Co., Tacoma, Wash.
Trent Inc., Philadelphia, Pa.
Vulcan Electric Co., Danvers, Mass.
Westinghouse Electric Corp., Pittsburgh, Pa.
●Wiegand Co., Edwin L., Pittsburgh, Pa.

HEATERS, SUSPENDED, RADIANT, ELECTRIC

●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Trent, Inc., Philadelphia, Pa.
●Wiegand Co., Edwin L., Pittsburgh, Pa.

HEATERS, SUSPENDED, RADIANT, GAS FIRED

Day & Night Div., Affiliated Gas Equipment, Inc., Monrovia, Calif.
Nat Corp., Kansas City, Mo.
●Olson & Co., Arthur A., Canfield, O.
Power Engineering Co., Chicago, Ill.

HEATERS, UNIT, ELECTRIC HEATING ELEMENT

Electromode Corp., Rochester, N. Y.
General Electric Co., Apparatus Dept., Schenectady, N. Y.
Kilbury Mfg. Co., Inc., Lawndale, Calif.
Lintern C., Berea, O.
Martin-Quaid Co., Philadelphia, Pa.
Meco, Inc., Portland, Ore.
Red Spot Electric Co., Tacoma, Wash.
Royal Heaters, Inc., Alhambra, Calif.
Trent Inc., Philadelphia, Pa.
Vulcan Electric Co., Danvers, Mass.
Westinghouse Electric Corp., Pittsburgh, Pa.
●Wiegand Co., Edwin L., Pittsburgh, Pa.

HEATERS, UNIT, GAS, PROPELLER FAN TYPE

Allan Engineering Co., Dallas, Tex.
American Blower Corp., Detroit, Mich.
Automatic Gas Equipment Co., Pittsburgh, Pa.
Barwick Mfg. Corp., Wichita, Kan.
●Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
Carrier Corp., Syracuse, N. Y.
Central States Mfg. Co., Inc., Arkansas City, Kan.
Clow & Sons, James B., Chicago, Ill.
Coroaire Heater Corp., The, Cleveland, O.
●General Gas Light Co., Kalamazoo, Mich.
Hastings Air Conditioning Co., Hastings, Neb.
International Sales Co., San Francisco, Calif.
●Ilg Electric Ventilating Co., Chicago, Ill.
●Jackson & Church Co., Saginaw, Mich.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Lennox Furnace Co., The, Marshalltown, Ia.
●Mueller Furnace Co., L. J., Milwaukee, Wis.
Nat Corp., Kansas City, Mo.
National Radiator Co., The, Johnstown, Pa.
Norman Products Co., Inc., Columbus, O.
Palmer Mfg. Corp., Phoenix, Ariz.
●Reznor Mfg. Co., Mercer, Pa.
Roberts-Gordon Appliance Corp., Buffalo, N. Y.
Sonner Burner Co., Winfield, Kan.
Surface Combustion Corp., Toledo, O.
Trane Co., The, La Crosse, Wis.
United Electric Service Co., Wichita Falls, Tex.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.
●Wing Mfg. Co., L. J., Linden, N. J.
●Zink Co., John, Tulsa, Okla.

HEATERS, UNIT, STEAM AND HOT WATER, CABINET TYPE

●Airtherm Mfg. Co., St. Louis, Mo.
●American Blower Corp., Detroit, Mich.
American Thermal Industries, Inc., Detroit, Mich.
●Brown Products Co., Forest Hills, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
Chicago Fan & Fin Coil Co., Chicago, Ill.
●Dunham Co., C. A., Chicago, Ill.
Hastings Air Conditioning Co., Hastings, Neb.
McQuay, Inc., Minneapolis, Minn.
●Modine Mfg. Co., Racine, Wis.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
●Trane Co., The, La Crosse, Wis.

● Advertisement in this issue. See Index to Advertisers, page 127d

●United States Air Conditioning Corp., Minneapolis, Minn.
●Webster & Co., Warren, Camden, N. J.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Young Radiator Corp., Racine, Wis.

HEATERS, UNIT, STEAM AND HOT WATER, CENTRIFUGAL FAN TYPE

●Airtherm Mfg. Co., St. Louis, Mo.
●American Blower Corp., Detroit, Mich.
American Thermal Industries, Inc., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Brown Products Co., Forest Hills, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
Carrier Corp., Syracuse, N. Y.
●Clarage Fan Co., Kalamazoo, Mich.
Chicago Fan & Fin Coil Co., Chicago, Ill.
●Dunham Co., C. A., Chicago, Ill.
Hastings Air Conditioning Co., Hastings, Neb.
Industrial Mfg. & Engineering Co., Chicago, Ill.
McQuay, Inc., Minneapolis, Minn.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
●Nesbitt, Inc., John J., Philadelphia, Pa.
●New York Blower Co., Chicago, Ill.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Temp-Control, Inc., Peoria, Ill.
●Trane Co., The, La Crosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
●Webster & Co., Warren, Camden, N. J.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Wilson Engineering Corp., Chicago, Ill.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
●Young Radiator Co., Racine, Wis.

HEATERS, UNIT, STEAM AND HOT WATER, PROPELLER FAN TYPE, HORIZONTAL BLOW

●Airtherm Mfg. Co., St. Louis, Mo.
●American Blower Corp., Detroit, Mich.
Beacon-Morris Corp., Boston, Mass.
Bern's Mfg. Co., Chicago, Ill.
●Bishop & Babcock Mfg. Co., Cleveland, O.
●Buffalo Forge Co., Buffalo, N. Y.
Carrier Corp., Syracuse, N. Y.
Chicago Fan & Fin Coil Co., Chicago, Ill.
●Clarage Fan Co., Kalamazoo, Mich.
●Dunham Co., C. A., Chicago, Ill.
●Fedders-Quigan Corp., Buffalo, N. Y.
●Grinnell Co., Inc., Providence, R. I.
Hartzell Propeller Fan Co., Piqua, O.
Ilg Electric Ventilating Co., Chicago, Ill.
Industrial Mfg. & Engineering Co., Chicago, Ill.
King Co., The, Owatonna, Minn.
Kisco Boiler & Engineering Co., St. Louis, Mo.
●McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.
Merchant & Evans Co., Philadelphia, Pa.
●Modine Mfg. Co., Racine, Wis.
●Muckle Mfg. Co., Owatonna, Minn.
Murray Mfg. Co., D. J., Wausau, Wis.
National Radiator Co., The, Johnstown, Pa.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
●Nesbitt, Inc., John J., Philadelphia, Pa.
●New York Blower Co., Chicago, Ill.
Power Engineering Co., Chicago, Ill.
Rittling Corp., The, Hamburg, N. Y.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, La Crosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
United States Radiator Corp., Detroit, Mich.
●Webster & Co., Warren, Camden, N. J.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Wilson Engineering Corp., Chicago, Ill.
●Wing Mfg. Co., L. J., Linden, N. J.
●Young Radiator Co., Racine, Wis.

HEATERS, UNIT, STEAM AND HOT WATER, PROPELLER FAN TYPE, VERTICAL BLOW

●Airtherm Mfg. Co., St. Louis, Mo.
●American Blower Corp., Detroit, Mich.
Beacon-Morris Corp., Boston, Mass.
●Bishop & Babcock Mfg. Co., Cleveland, O.
●Buffalo Forge Co., Buffalo, N. Y.
Carrier Corp., Syracuse, N. Y.
Chicago Fan & Fin Coil Co., Chicago, Ill.
●Clarage Fan Co., Kalamazoo, Mich.
●Dunham Co., C. A., Chicago, Ill.
●Fedders-Quigan Corp., Buffalo, N. Y.
●Grinnell Co., Inc., Providence, R. I.
●McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.
●Modine Mfg. Co., Racine, Wis.
Murray Mfg. Co., D. J., Wausau, Wis.
National Radiator Co., The, Johnstown, Pa.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
●Nesbitt, Inc., John J., Philadelphia, Pa.
●New York Blower Co., Chicago, Ill.
Power Engineering Co., Chicago, Ill.
●Rittling Corp., The, Hamburg, N. Y.
●Trane Co., The, La Crosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
United States Radiator Corp., Detroit, Mich.
●Webster & Co., Warren, Camden, N. J.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Wing Mfg. Co., L. J., Linden, N. J.
●Young Radiator Co., Racine, Wis.

HEATERS, VENTILATION

See Surface, Finned, Heating; Ventilators, Roof, Fan; Ventilators, Unit; Surface, Finned, Heating; Ventilators, Roof, Fan

HEATERS, WATER, AIR-TANKLESS

Tankless Water Heater and Compression Tank Combined

●Bell & Gossett Co., Morton Grove, Ill.
General Fittings Co., Povidence, R. I.
●Taco Heaters, Inc., Providence, R. I.

HEATERS, WATER, CAST IRON, COAL FIRED

Adams Co., The, Dubuque, Ia.
●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Burnham Corp., Boiler Div., Irvington, N. Y.
Eastern Foundry Co., Peerless Heater Div., Boyertown, Pa.
International Heater Co., Utica, N. Y.
Prox Co., Inc., Frank, Terre Haute, Ind.
●Smith Co., Inc., H. B., The, Westfield, Mass.
●Spencer Heater Div., Avco Mfg. Corp., Williamsport, Pa.
Stokol Stoker Co., Inc., Dayton, O.
United States Radiator Corp., Detroit, Mich.
Weil-McLain Co., Michigan City, Ind.

HEATERS, WATER, ELECTRIC

Allcraft Mfg. Co., Cambridge, Mass.
Auburn Burner Co., Auburn, Ind.
Bastian-Morley Co., Inc., LaPorte, Ind.
Bogue Electric Co., Paterson, N. J.
Clayton & Lambert Mfg. Co., Louisville, Ky.
Cutler-Hammer, Inc., Milwaukee, Wis.
Frigidaire Div., General Motors Corp., Dayton, O.
●General Electric Co., Apparatus Dept., Schnectady, N. Y.
Hanson-Gates Mfg. Co., Inc., Reading, Mass.
Heat-X-Changer Co., Inc., The, New York, N. Y.
Hotpoint Inc., Chicago, Ill.
Hotstream Heater Co., Cleveland, O.
Industrial Engineering & Equipment Co., St. Louis, Mo.
Livingstone Engineering Co., Worcester, Mass.
Martin-Quaid Co., Philadelphia, Pa.
Red Spot Electric Co., Tacoma, Wash.
Rheem Mfg. Co., New York, N. Y.
Smith Corp., A. O., Milwaukee, Wis.
Trent Inc., Philadelphia, Pa.
Viking Mfg. Corp., Cleveland, O.
Westinghouse Electric Corp., Pittsburgh, Pa.
●Wiegand Co., Edwin L., Pittsburgh, Pa.
Wood Co., John, Conshohocken, Pa.

HEATERS, WATER, GAS FIRED

Alert Boiler & Mfg. Co., Detroit, Mich.
●Aldrich Co., The, Wyoming, Ill.
●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Auburn Burner Co., Auburn, Ind.
Bastian-Morley Co., Inc., LaPorte, Ind.
Birchfield Boiler, Inc., Tacoma, Wash.
●Brown Products Co., Forest Hills, N. Y.
Bryant Corp., C. L., Cleveland, O.
●Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
Clayton & Lambert Mfg. Co., Louisville, Ky.
●Cleaver-Brooks Co., Milwaukee, Wis.
Day & Night Div., Affiliated Gas Equipment, Inc., Monrovia, Calif.
Delco Appliance Div., General Motors Corp., Rochester, N. Y.
Dewey-Shepard Boiler Co., Indianapolis, Ind.
Duo-Therm Div., Motor Wheel Corp., Lansing, Mich.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Gold Top Heating, Inc., Butte, Mont.
Hanson-Gates Mfg. Co., Inc., Reading, Mass.
Heat Equipment not Inc., Chicago, Ill.
Hook & Ackerman, Inc., New York, N. Y.
Hotstream Heater Co., Cleveland, O.
Kehm Corp., The, Chicago, Ill.
Mission Appliance Corp., Hawthorne, Calif.
Montgomery Bros., San Francisco, Calif.
●Mueller Furnace Co., L. J., Milwaukee, Wis.
Pacific Steel Boiler Div., United States Radiator Corp., Detroit, Mich.

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Pittsburg Water Heater Co., Pittsburgh, Pa.
Rheem Mfg. Co., New York, N. Y.
Richmond Radiator Co., New York, N. Y.
Rotary Mfg. Co., Los Angeles, Calif.
Ruud Mfg. Co., Pittsburgh, Pa.
Schoedinger, F. O., Columbus, O.
●Sellers Engineering Co., Chicago, Ill.
●Smith Co., Inc., H. B., The, Westfield, Mass.
Smith Corp., A. O., Milwaukee, Wis.
Stout & Sons, David, St. Louis, Mo.
United States Radiator Corp., Detroit, Mich.
Viking Mfg. Corp., Cleveland, O.
Wood Co., John, Conshohocken, Pa.

HEATERS, WATER, INDIRECT

Akwa Heaters, Inc., New York, N. Y.
●American District Steam Co., North Tonawanda, N. Y.
●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Bell & Gossett Co., Morton Grove, Ill.
Birchfield Boiler, Inc., Tacoma, Wash.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Bryant Heater Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
●Davis Engineering Corp., Elizabeth, N. J.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Ferguson & Lange Foundry Co., Chicago, Ill.
General Fittings Co., Providence, R. I.
General Heaters & Regulators Co., Chicago, Ill.
Graham Mfg. Co., Inc., New York, N. Y.
Hook & Ackerman, Inc., New York, N. Y.
Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
Kehm Corp., The, Chicago, Ill.
Lewis & Co., Joseph E., Baltimore, Md.
Lindy Heaters, Inc., New York, N. Y.
National Radiator Co., The, Johnstown, Pa.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
●Sellers Engineering Co., Chicago, Ill.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Western Blower Co., Seattle, Wash.
Whitlock Mfg. Co., Hartford, Conn.
Yula Water Heaters, Inc., New York, N. Y.

HEATERS, WATER, INDIRECT, COMBINATION TANK AND TANKLESS

●Bell & Gossett Co., Morton Grove, Ill.
Birchfield Boiler, Inc., Tacoma, Wash.
Burnham Corp., Boiler Div., Irvington, N. Y.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Crotty Mfg. Corp., Long Island, N. Y.
●Davis Engineering Corp., Elizabeth, N. J.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
●Eclipse Fuel Enginering Co., Rockford, Ill.
General Fittings Co., Providence, R. I.
Heat Equipment not Inc., Chicago, Ill.
Hook & Ackerman, Inc., New York, N. Y.
Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
Lindy Heaters, Inc., New York, N. Y.
Penberthy Injector Co., Detroit, Mich.
Richmond Engineering Co., Inc., Richmond, Va.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
●Taco Heaters, Inc., Providence, R. I.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Western Blower Co., Seattle, Wash.
Whitlock Mfg. Co., Hartford, Conn.
Yula Water Heaters, Inc., New York, N. Y.

HEATERS, WATER, OIL FIRED

Aeroil Products Co., Inc., South Hackensack, N. J. (Portable)
●Air Devices, Inc., New York, N. Y.
●Aldrich Co., The, Wyoming, Ill.
Auburn Burner Co., Auburn, Ind.
Bastian-Morley Co., Inc., LaPorte, Ind.
Birchfield Boiler, Inc., Tacoma, Wash.
●Brown Products Co., Forest Hills, N. Y.
●Century Engineering Corp., Cedar Rapids, Ia.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Clayton & Lambert Mfg. Co., Louisville, Ky.
●Cleaver-Brooks Co., Milwaukee, Wis.
Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.
Delco Appliance Div., General Motors Corp., Rochester, N. Y.
Dewey-Shepard Boiler Co., Indianapolis, Ind.
Duo-Therm Div., Motor Wheel Corp., Lansing, Mich.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
Electrol Burner Mfg. Co., Inc., Rutherford, N. J.
●Fitzgibbons Boiler Co., Inc., New York, N. Y.
●General Automatic Products Corp., Baltimore, Md.
Gold Top Heating, Inc., Butte, Mont.
Hanson-Gates Mfg. Co., Inc., Reading, Mass.
Heat Equipment not Inc., Chicago, Ill.
Hotstream Heater Co., Cleveland, O.
Johnson Co., S. T., Philadelphia, Pa.
Nu-Way Corp., The, Rock Island, Ill.
Pacific Steel Boiler Div., United States Radiator Corp., Detroit, Mich.
Petroleum Heat & Power Co., Stamford, Conn.
Preferred Utilities Mfg. Corp., New York, N. Y.
●Ray Oil Burner Co., San Francisco, Calif.
Reif-Rexoil, Inc., Buffalo, N. Y.
Rheem Mfg. Co., New York, N. Y.
Scott-Newcomb, Inc., St. Louis, Mo.
Shephard Heater Co., Inc., Terre Haute, Ind.
●Smith Co., Inc., H. B., The, Westfield, Mass.
Stokol Stoker Co., Inc., Dayton, O.
United States Radiator Corp., Detroit, Mich.
Vapor Heating Corp., Chicago, Ill.
Viking Mfg. Corp., Cleveland, O.
York Electric and Machine Co., York, Pa.
●York-Shipley, Inc., York, Pa.

HEATERS, WATER, STEAM, INSTANTANEOUS

Akwa Heaters, Inc., New York, N. Y.
●American District Steam Co., North Tonawanda, N. Y.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
●Bell & Gossett Co., Morton Grove, Ill.
Brownell Co., The, Dayton, O.
Coe Mfg. Co., Painesville, O.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
●Davis Engineering Corp., Elizabeth, N. J.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Duffy Engrg. Co., Portland, Ore.
●Eclipse Fuel Engineering Co., Rockford, Ill.
●Fitzgibbons Boiler Co., Inc., New York, N. Y.
General Fittings Co., Providence, R. I.
General Heaters & Regulators Co., Chicago, Ill.
Gerstein & Cooper Co., Inc., South Boston, Mass.
Graham Mfg. Co., Inc., New York, N. Y.
Hasco Valve & Machine Co., Milwaukee, Wis.
Heat Transfer Products, Inc., Carbondale, Pa.
Howard Iron Wks. & Alberger Heater Div., Buffalo, N. Y.
International Engineering Wks., Inc., Framingham, Mass.
Johnson Corp., The, Three Rivers, Mich.
Keckley Co., O. C., Chicago, Ill.
Koven & Bro., Inc., L. O., Jersey City, N. J.
Lewis & Co., Joseph E., Baltimore, Md.
Lindy Heaters, Inc., New York, N. Y.
Marion Machine Foundry & Supply Co., Marion, Ind.
Montgomery Bros., San Francisco, Calif.
National Pipe Bending Co., New Haven, Conn.
O'Brien Steam Specialty Co., Inc., Syracuse, N. Y.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Pick Mfg. Co., West Bend, Wis. (direct steam injection)
Quaker City Iron Works, Philadelphia, Pa.
Richmond Engineering Co., Inc., Richmond, Va.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
●Swartwout Co., Cleveland, O.
●Taco Heaters, Inc., Providence, R. I.
Whitlock Mfg. Co., Hartford, Conn.
Yula Water Heaters, Inc., New York, N. Y.

HEATERS, WATER, STEAM, STORAGE

Akwa Heaters, Inc., New York, N. Y.
Alert Boiler & Mfg. Co., Detroit, Mich.
●American District Steam Co., North Tonawanda, N. Y.
●Bell & Gossett Co., Morton Grove, Ill.
Birchfield Boiler, Inc., Tacoma, Wash.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Brownell Co., The, Dayton, O.
Burnham Corp., Boiler Div., Irvington, N. Y.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Dahlquist Mfg. Co., Inc., Div. of Process Engineering Inc., Somerville, Mass.
●Davis Engineering Corp., Elizabeth, N. J.
●Fitzgibbons Boiler Co., Inc., New York, N. Y.
General Fittings Co., Providence, R. I.
General Heaters & Regulators Co., Chicago, Ill.
Gerstein & Cooper Co., Inc., South Boston, Mass.
Heat Transfer Products, Inc., Carbondale, Pa.
Hoppes Mfg. Co., Inc., Springfield, O.
Howard Iron Wks. & Alberger Heater Div., Buffalo, N. Y.
Johnson Corp., The, Three Rivers, Mich.
Keckley Co., O. C., Chicago, Ill.
●Kewanee Boiler Corp., Kewanee, Ill.
Koven & Bro., Inc., L. O., Jersey City, N. J.
Manitowoc Engineering Wks., Manitowoc, Wis.
Marion Machine Foundry & Supply Co., Marion, Ind.
National Pipe Bending Co., New Haven, Conn.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Penberthy Injector Co., Detroit, Mich.
Quaker City Iron Works, Philadelphia, Pa.
Richmond Engineering Co., Inc., Richmond, Va.
Rotary Mfg. Co., Los Angeles, Calif.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
Stout & Sons, David, St. Louis, Mo.
●Swartwout Co., Cleveland, O.
●Taco Heaters, Inc., Providence, R. I.

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Vogt Machine Co., Henry, Louisville, Ky.
Waterfilm Boilers, Inc., Jersey City, N. J.
Western Blower Co., Seattle, Wash.
Whitlock Mfg. Co., Hartford, Conn.
Yula Water Heaters Inc., New York, N. Y.

HEATERS, WATER, STEEL, COAL FIRED

Aeroil Products Co., Inc., South Hackensack, N. J. (Portable)
Birchfield Boiler, Inc., Tacoma, Wash.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Catskill Metal Works, Inc., Catskill, N. Y.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
●Fitzgibbons Boiler Co., Inc., New York, N. Y.
Heat Equipment not Inc., Chicago, Ill.
International Engineering Wks., Inc., Framingham, Mass.
Johnston Bros., Inc., Ferrysburg, Mich.
●Kewanee Boiler Corp., Kewanee, Ill.
Pacific Steel Boiler Div., United States Radiator Corp., Detroit, Mich.
●Terre Haute Boiler Works, Co., Terre Haute, Ind.

HEATING BOILERS

See Boilers, Heating

HEATING COILS

See Surface, Heating

HEATING SURFACE

See Surface, Heating

HOSE CLAMPS

See Clamps, Hose

HOSE, METAL, AND FITTINGS

Aero-Coupling Corp., Burbank, Calif.
Aeroquip Corp., Jackson, Mich.
American Metal Hose Branch, The American Brass Co., Waterbury, Conn.
Atlantic Metal Hose Co., Inc., New York, N. Y.
Brockway Co., Naugatuck, Conn.
Chicago Metal Hose Corp., Maywood, Ill.
Chiksan Co., Brea, Calif.
Everhot Products Co., Chicago, Ill.
Gil-Lair Products, Inc., Pasadena, Calif.
Packless Metal Products Corp., New Rochelle, N. Y.
Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.
Seamlex Co., Inc., Long Island City, N. Y.
Techniflex Corp., Port Jervis, N. Y.
Titeflex, Inc., Newark, N. J.
United Metal Hose Co., Inc., Long Island City, N. Y.
●Zallea Brothers, Wilmington, Del.

HOSE, NON-METAL, AND FITTINGS

Aero-Coupling Corp., Burbank, Calif.
Aeroquip Corp., Jackson, Mich.
American Ventilating Hose Co., New York, N. Y.
Arrowhead Rubber Co., Downey, Calif.
Boston Woven Hose & Rubber Co., Cambridge, Mass.
Continental Rubber Works, Erie, Pa.
De Vilbiss Co., The, Toledo, O.
Flexible Tubing Corp., Branford, Conn.
Gates Rubber Co., The, Denver, Colo.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Hamilton Rubber Mfg. Corp., Trenton, N. J.
●Henry Valve Co., Melrose Park, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
Raybestos-Manhattan, Inc., Passaic, N. J.
Republic Rubber Div., Lee Rubber and Tire Corp., Youngstown, O.
Resistoflex Corp., Belleville, N. J.
Roylyn, Inc., Glendale, Calif.
Superior Valve and Fittings Co., Pittsburgh, Pa.
Techniflex Corp., Port Jervis, N. Y.
Thermoid Co., Trenton, N. J.
United States Rubber Co., New York, N. Y.
Weatherhead Co., The, Cleveland, O.

HOSE, VENTILATING

See Ducts and Duct Fittings, Prefabricated, Non-Metallic

HOT GAS DEFROSTING

See Systems, Hot Gas Defrosting for Refrigeration

HOT WATER HEATING SYSTEMS

See Systems, Heating, Hot Water

HOT WATER HEATING SYSTEMS, BALANCING ELBOWS FOR

See Elbows, Balancing, For Hot Water Heating System

HOT WATER PRESSURE REGULATORS

See Regulators, Pressure, Hot Water Heating Systems

HOUSINGS, FAN, CENTRIFUGAL

(Housing only—not complete fans)

●Bishop & Babcock Mfg. Co., Cleveland, O.
●Brundage Co., The, Kalamazoo, Mich.
Champion Blower & Forge Co., Lancaster, Pa.
Cincinnati Metalcrafts Inc., Cincinnati, O.
●Clarage Fan Co., Kalamazoo, Mich.
Commercial Shearing & Stamping Co., Youngstown, O.
Detroit Stamping Co., Detroit, Mich.
Hastings Air Conditioning Co., Hastings, Neb.
Haveg Corp., Newark, Del. (plastic for corrosive fumes)
Lau Blower Co., Dayton, O.
Martin Fan & Blower Co., Chicago, Ill.
Maysteel Products, Inc., Milwaukee, Wis.
Northern Blower Co., Cleveland, O.
Palmer Mfg. Corp., Phoenix, Ariz.
Schwitzer-Cummins Co., Indianapolis, Ind.
Torit Mfg. Co., St. Paul, Minn.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utica Products, Inc., Utica, N. Y.
Viking Air Conditioning Corp., Cleveland, O.

HOUSINGS, FAN, PROPELLER

(Housings only—not complete fans)

Acme Equipment Co., Muskogee, Okla.
Allen Ventilator Div., Production Planning Co., Rochester, Mich.
Cincinnati Metalcrafts Inc., Cincinnati, O.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
Commercial Shearing & Stamping Co., Youngstown, O.
●De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Haveg Corp., Newark, Del. (plastic for corrosive fumes)
Palmer Mfg. Corp., Phoenix, Ariz.
Schwitzer-Cummins Co., Indianapolis, Ind.

HUMIDIFIERS, CENTRAL PLANT

●Air & Refrigeration Corp., New York, N. Y.
●American Blower Corp., Detroit, Mich.
American Foundry & Furnace Co., Bloomington, Ill.
American Moistening Co., Providence, R. I.
●Armstrong Machine Wks., Three Rivers, Mich.
Bahnson Co., Winston-Salem, N. C.
Barber-Colman Co., Rockford, Ill.
●Brundage Co., The, Kalamazoo, Mich.
Buensod-Stacey, Inc., New York, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
Carrier Corp., Syracuse, N. Y.
●Clarage Fan Co., Kalamazoo, Mich.
Cleveland Humidifier Co., Cleveland, O.
●Farr Co., Los Angeles, Calif.
●Johnson Service Co., Milwaukee, Wis.
●McDonnell & Miller, Inc., Chicago, Ill.
Mellish & Murray Co., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
National Air Conditionng Inc., Johnstown, Pa.
National Engineering & Mfg. Co., Kansas City, Mo.
●Niagara Blower Co., New York, N. Y.
Parks-Cramer Co., Fitchburg, Mass.
●Powers Regulator Co., Chicago, Ill.
Skuttle Mfg. Co., Detroit, Mich.
●Surface Combustion Corp., Toledo, O.
●Trane Co., The, LaCrosse, Wis.
Viking Air Conditioning Corp., Cleveland, O.
Vilter Mfg. Co., Milwaukee, Wis.
●York Corp., York, Pa.

HUMIDIFIERS, DIRECT, SPRAY HEAD

American Moistening Co., Providence, R. I.
Anetsberger Bros., Inc., Northbrook, Ill.
●Armstrong Machine Works, Three Rivers, Mich.
Bahnson Co., Winston-Salem, N. C. (Centrifugal)
●Binks Mfg. Co., Chicago, Ill.
Blower Application Co., Milwaukee, Wis.
●Buffalo Forge Co., Buffalo, N. Y.
Drying Systems, Inc., Chicago, Ill.
●Grinnell Co., Inc., Providence, R. I.
International Moistening Co., Providence, R. I.
●Maid-O'Mist, Inc., Chicago, Ill.
Manufacturers Machine Co., North Andover, Mass.
●Marley Co., Inc., The, Kansas City, Kans.
●Marlo Coil Co., St. Louis, Mo.
Murray Mfg. Co., D. J., Wausau, Wis.
Paasche Airbrush Co., Chicago, Ill.
Parks-Cramer Co., Fitchburg, Mass.
Pfening Co., Fred D., Columbus, O.
Rhode Island Humidifier & Ventilating Co., Boston, Mass.
Ross Sprinkler Co., Pasadena, Calif.
Somers, Inc., H. J., Detroit, Mich.
Spray Engineering Co., Somerville, Mass.
●Spraying Systems Co., Bellwood, Ill.
Supreme Electric Products Corp., Rochester, N. Y.
●Trane Co., The, LaCrosse, Wis.
Water Cooling Corp., New York, N. Y.

● Advertisement in this issue. See Index to Advertisers, page 127d

HUMIDIFIERS FOR RADIATORS AND CONVECTORS

Kauffman Air Conditioning Corp., St. Louis, Mo.
●Maid-O'-Mist, Inc., Chicago, Ill.
Skilbeck Mfg. Co., Kenosha, Wis.
Techtmann Industries, Inc., Milwaukee, Wis.

HUMIDIFIERS, RADIATOR VENT VALVE

G & H Mfg. Co., Philadelphia, Pa.
●Maid-O'Mist, Inc., Chicago, Ill.
Skilbeck Mfg. Co., Kenosha, Wis.

HUMIDIFIERS, UNIT, ROOM TYPE (Without Heating)

●Armstrong Machine Wks., Three Rivers, Mich.
Carrier Corp., Syracuse, N. Y.
Crowell & Dunn, Inc., New York, N. Y.
Daffin Mfg. Co., Lancaster, Pa.
Fresh'nd-Aire Co., Div. of Cory Corp., Chicago, Ill.
Health Trola Div., Excel Heating & Air Conditioning Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Little Giant Vaporizer Co., Inc., Oklahoma City, Okla.
Murray Mfg. Co., D. J., Wausau, Wis.
National Engineering & Mfg. Co., Kansas City, Mo.
Palmer Mfg. Corp., Phoenix, Ariz.
Somers, Inc., H. J., Detroit, Mich.
●Spraying Systems Co., Bellwood, Ill.
Standard Engineering Wks., Pawtucket, R. I.
●United States Air Conditioning Corp., Minneapolis, Minn.
Walton Laboratories, Inc., Irvington, N. J.
Water Cooling Corp., New York, N. Y.

HUMIDIFYING RADIATORS

See Radiators, Humidifying

HUMIDISTATS

American Instrument Co., Silver Spring, Md.
American Moistening Co., Providence, R. I.
Autempco Corp., New York, N. Y.
Bahnson Co., Winston-Salem, N. C.
Barber-Colman Co., Rockford, Ill.
Bristol Co., The, Waterbury, Conn.
Buensod-Stacey, Inc., New York, N. Y.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
●General Controls Co., Glendale, Calif.
●Johnson Service Co., Milwaukee, Wis.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Parks-Cramer Co., Fitchburg, Mass.
●Penn Electric Switch Co., Goshen, Ind.
●Powers Regulator Co., Chicago, Ill.
Standard Engineering Wks., Pawtucket, R. I.
Walton Laboratories, Inc., Irvington, N. J.

HUMIDITY INDICATORS

See Indicator-Controllers, Relative Humidity; Psychrometers

HUMIDITY RECORDERS

See Recorders, Humidity

HUMIDITY AND TEMPERATURE CONTROLS

See Humidistats; Recorder-Controllers; Thermostats

HYDRAULIC PIPE PUSHERS

See Pushers, Pipe, Hydraulic

HYDRAULIC SPEED CHANGERS

See Changers, Speed, Hydraulic Coupling

HYGROMETERS

American Moistening Co., Providence, R. I.
Bristol Co., The, Waterbury, Conn.
Daigger & Co., A., Chicago, Ill.
Fee and Stemwedel, Inc., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
G. M. Mfg. Co., New York, N. Y.
Garden City Instruments, Inc., Chicago, Ill.
General Scientific Equipment Co., Philadelphia, Pa.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
H-B Instrument Co., Philadelphia, Pa.
Hill, E. Vernon & Co., Chicago, Ill.
Illinois Testing Laboratories, Inc., Chicago, Ill.
International Moistening Co., Providence, R. I.
●Johnson Service Co., Milwaukee, Wis.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
Palmer Thermometers, Inc., Cincinnati (Norwood), O.
Scientific Instrument Co., Detroit, Mich.
Standard Thermometer, Inc., Boston, Mass.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Wallace & Tiernan Co., Inc., Newark, N. J.
Weksler Thermometer Corp., New York, N. Y.
Will Corp., Rochester, N. Y.

HYGROSTATS

See Humidistats

IDENTIFICATION MARKERS (For Piping Services)

Brady Co., W. H., Milwaukee, Wis.
Western Lithograph Co., Los Angeles, Calif.

IMMERSION THERMOSTATS

See Thermostats, Immersion

INDICATING THERMOMETERS

See Thermometers, Indicating

INDICATOR-CONTROLLERS, PRESSURE

Automatic Control Co., St. Paul, Minn.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Cooper Co., Clark, Palmyra, N. J.
Electro Products Laboratories, Inc., Chicago, Ill.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Giannini & Co., Inc., G. M., Pasadena, Calif.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
●Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
Mason-Neilan Regulator Co., Boston, Mass.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
●Powers Regulator Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Shallcross Controls, Inc., Milwaukee, Wis.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Trimount Instrument Co., Chicago, Ill.
United States Gauge, Div. of American Machine and Metals, Inc., Sellersville, Pa.

INDICATOR-CONTROLLERS, RELATIVE HUMIDITY

American Instrument Co., Silver Spring, Md.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Barber-Colman Co., Rockford, Ill.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
●Johnson Service Co., Milwaukee, Wis.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
●Powers Regulator Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Taylor Instrument Companies, Rochester, N. Y.

INDICATOR-CONTROLLERS, TEMPERATURE

American Instrument Co., Silver Spring, Md.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Cooper Co., Clark, Palmyra, N. J.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
●Illinois Engineering Co., Chicago, Ill.
Illinois Testing Laboratories, Inc., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
Leeds & Northrup Co., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Mason-Neilan Regulator Co., Boston, Mass.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.

Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
●Powers Regulator Co., Chicago, Ill.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.
●Sarco Co., Inc., New York, N. Y.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Trerice Co., H. O., Detroit, Mich.
United States Gauge, Div. of American Machine and Metals, Inc., Sellersville, Pa.
Wheelco Instruments Co., Chicago, Ill.
●Wiegand Co., Edwin L., Pittsburgh, Pa.

INDICATORS, CARBON DIOXIDE, BOILER ROOM

For Portable CO₂ Analyzers, See Analyzers, Carbon Dioxide, Portable

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Davis Instruments, Div. of Davis Emergency Equipment Co., Inc., Newark, N. J.
Defender Instrument and Regulator Co., St. Louis, Mo.
Engelhard, Inc., Chas., Newark, N. J.
Ess Instrument Co., Bergenfield, N. J.
●Hays Corp., Michigan City, Ind.
Permutit Co., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.

INDICATORS, DEW POINT

American Instrument Co., Silver Spring, Md.
Foxboro Co., Foxboro, Mass.
Illinois Testing Laboratories, Inc., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Pittsburgh Lectrodryer Corp., Pittsburgh, Pa.

INDICATORS, FLOW

See Meters, Flow

INDICATORS, LIQUID LEVEL, BOLER AND TANK

Automatic Control Co., St. Paul, Minn.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Barton Instrument Corp., Los Angeles, Calif.
Boston Auto Gage Co., Pittsfield, Mass.
Bristol Co., The, Waterbury, Conn.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
B/W Controller Corp., Birmingham, Mich.
Cochrane Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
Defender Instrument & Regulator Co., St. Louis, Mo.
Detroit Brass & Malleable Works, Detroit, Mich.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
Healy Ruff Co., St. Paul, Minn.
●Henry Valve Co., Melrose Park, Ill.
Liquidepth Indicators, Inc., Long Island City, N. Y.
Magnetrol, Inc., Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
●McDonnell & Miller, Inc., Chicago, Ill.
Meriam Instrument Co., The, Cleveland, O.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moore Products Co., Philadelphia, Pa.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
Penberthy Injector Co., Detroit, Mich.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Petrometer Corp., Long Island City, N. Y.
Reliance Gauge Column Co., Cleveland, O.
Rochester Mfg. Co., Inc., Rochester, N. Y.
●Stephens-Adamson Mfg. Co., Aurora, Ill.
Swift Lubricator Co., Elmira, N. Y.
●Taylor Instrument Companies, Rochester, N. Y.
Trimount Instrument Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
Wallace & Tiernan Co., Inc., Newark, N. J.
●Yarnall-Waring Co., Philadelphia, Pa.

INDICATORS, RELATIVE HUMIDITY

American Instrument Co., Silver Spring, Md.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Walton Laboratories, Inc., Irvington, N. J.

INDICATORS, SOUND LEVEL

●General Electric Co., Apparatus Dept., Schenectady, N. Y.

INDIRECT HEATING SURFACE

See Surface, Heating

INDIRECT WATER HEATERS

See Heaters, Water, Indirect

INDUSTRIAL AIR CONDITIONERS

See Units, Air Conditioning, Industrial Type

INDUSTRIAL DRYERS

See Dryers, Industrial

INJECTOR RECIRCULATORS FOR REFRIGERANTS

Phillips & Co., H. A., Chicago, Ill.

INSTANTANEOUS WATER HEATERS

See Heaters, Water, Steam, Instantaneous

INSULATING CONCRETE

See Concrete, Insulating

INSULATION, BOILER AND TANK

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Alfol Div., Reflectal Corp., New York, N. Y. (Aluminum foil)
Alton Mineral Wool Insulation Co., St. Louis, Mo.
●Armstrong Cork Co., Lancaster, Pa. (85% Magnesia)
Badham Insulation Co., Inc., Birmingham, Ala.
Baldwin-Hill Co., Trenton, N. J. (Rock wool)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Bigelow Liptak Corp., Detroit, Mich.
Bird-Archer Co., Philadelphia, Pa.
Botfield Refractories Co., Philadelphia, Pa.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Cork Import Corp., Englewood, N. J. (Corkboard)
Eagle-Picher Co., Cincinnati, O.
Ehret Magnesia Mfg. Co., Valley Forge, Pa. (Magnesia)
Forty-Eight Insulations, Inc., Aurora, Ill.
●Grant Wilson Inc., Chicago, Ill.
Green Fire Brick Co., Mexico, Mo.
International Vermiculite Co., Girard, Ill.
Johns-Manville, New York, N. Y.
Kaylo Div., Owens-Illinois Glass Co., Toledo, O.
Keasbey Co., Robert A., New York, N. Y. (Asbestos)
●Keasbey & Mattison Co., Ambler, Pa.
Krehbiel Co., J. H., Chicago, Ill.
Laclede-Christy Co., St. Louis, Mo.
Lockport Cotton Batting Co., Lockport, N. Y.
Monsanto Chemical Co., Merimac Div., Boston, Mass.
●Mundet Cork Corp., North Bergen, N. J. (Cork)
Munn and Steele, Inc., South Boston, Mass.
National Gypsum Co., Buffalo, N. Y. (Rock wool)
Norristown Magnesia & Asbestos Co., Norristown, Pa. (Asbestos and magnesia)
●Owens-Corning Fiberglas Corp., Toledo, O. (Blanket and board)
Pabco Products Inc., San Francisco, Calif.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Pittsburgh Corning Corp., Pittsburgh, Pa.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Plibrico Jointless Firebrick Co., Chicago, Ill.
Poe Co., C. W., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Reflectal Corp., New York, N. Y.
Refractory & Insulation Corp., New York, N. Y. (Blanket, block, cement)
Robinson Industries, Coleman, Mich. (expanded plastic)
Rock Fleece Co., El Paso, Tex.
Ruberoid Co., New York, N. Y. (Asbestos, magnesia)
Sall Mountain Co., Chicago, Ill.
Schundler & Co., Inc., F. E., Long Island City, N. Y.
Smith & Kanzler Corp., Linden, N. J.
Standard Asbestos Mfg. Co., Chicago, Ill.
Standard Fuel Engineering Co., Detroit, Mich.
Telsit Insulation Co., Bronx, N. Y.
●Union Asbestos & Rubber Co., Cicero, Ill.
United Cork Co., Kearney, N. J. (Cork)
United States Mineral Wool Co., South Milwaukee, Wis.
Walker Jamar Co., Duluth, Minn.
Western Mineral Products Co., Minneapolis, Minn.
Zonolite Co., Chicago, Ill. (plastic)

INSULATION, BUILDING

Acme Asbestos Covering & Flooring Co., Chicago, Ill. (Rock wool)
Air-O-Cel Co., Detroit, Mich.
Alfol Div., Reflectal Corp., New York, N. Y. (Aluminum foil)
Alton Mineral Wool Insulation Co., St. Louis, Mo.
American Flange & Mfg. Co., Inc., New York, N. Y. (Metal sheets)
American Hair & Felt Co., Chicago, Ill. (Hair felt)
●Armstrong Cork Co., Lancaster, Pa. (Corkboard, fibre board)
Bache & Co., Semon, New York, N. Y. (Glass wool)
Badham Insulation Co., Inc., Birmingham, Ala.

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Baldwin-Hill Co., Trenton, N. J. (Rock wool)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O. (Rock wool)
Carney Co., Inc., The, Mankato, Minn.
Celotex Corp., The, Chicago, Ill.
Certain-teed Products Corp., Ardmore, Pa.
Chamberlin Co. of America, Detroit, Mich.
Cork Import Corp., Englewood, N. J. (Corkboard)
Cork Insulation Co., Inc., New York, N. Y. (Corkboard)
Dry-Zero Corp., Chicago, Ill.
Eagle-Picher Co., Cincinnati, O. (Mineral wool, blankets, batts, granulated, loose)
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Fir-tex Insulating Board Co., St. Helens, Ore. (Wood fibre-board)
Flintkote Co., The, New York, N. Y. (Glass wool)
General Insulating Products Co., Brooklyn, N. Y. (Rock wool)
●Gustin Bacon Mfg. Co., Kansas City, Mo.
Hogan & Co., Inc., C. T., New York, N. Y. (reflective)
●Infra Insulation, Inc., New York, N. Y. (reflective)
Insulite Div. Minnesota and Ontario Paper Co., Minneapolis, Minn. (Wool fibre)
Insul-Wooi Insulation Corp., Wichita, Kans.
International Vermiculite Co., Girard, Ill. (Loose fill)
Isoflex Corp., San Francisco, Calif.
Johns-Manville, New York, N. Y. (Rock wool and wood fibre-board)
Johnston Foil Mfg. Co., St. Louis, Mo. (Foil, aluminum, tin, lead)
Kaylo Div., Owens-Illinois Glass Co., Toledo, O.
Kimberly-Clark Corp., Neenah, Wis.
Lockport Cotton Batting Co., Lockport, N. Y.
Masonite Corp., Chicago, Ill. (Blanket)
Mineral Insulation Co., Chicago Ridge, Ill. (Rock wool)
Multi-Cell Sales Corp., Minneapolis, Minn. (Blanket, quilted newspaper)
●Mundet Cork Corp., North Bergen, N. J. (Cork)
Munn & Steele, Inc., South Boston, Mass.
National Gypsum Co., Buffalo, N. Y.
Nelson Mfg. Co., B. F., Minneapolis, Minn.
●Owens-Corning Fiberglas Corp., Toledo, O.
Pacific Lumber Co., The, San Francisco, Calif.
Pittsburgh Corning Corp., Pittsburgh, Pa.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Plastergon Wall Board Co., Buffalo, N. Y. (Rigid board)
Poe Co., C. W., Cleveland, O.
Reflectal Corp., New York, N. Y.
Refractory & Insulation Corp., New York, N. Y. (Rock, slag wool)
Reynolds Metals Co., Louisville, Ky.
Rock Fleece Co., El Paso, Tex.
Rubatex Div., Great American Industries, Inc., Bedford, Va.
Russell Co., F. C., The, Cleveland, O.
Silvercote Products, Inc., Chicago, Ill.
Sprayo-Flake Co., Chicago, Ill.
Standard Asbestos Mfg. Co., Chicago, Ill. (Asbestos, hairfelt)
Stic-Klip Mfg. Co., Cambridge, Mass. (Insulation fasteners)
Tennessee Products and Chemical Corp., Nashville, Tenn.
United Cork Companies, Kearny, N. J. (Cork)
United States Gypsum Co., Chicago, Ill. (Wool and board)
United States Mineral Wool Co., South Milwaukee, Wis. (Mineral wool)
Universal Gypsum & Lime Co., Chicago, Ill. (Loose fill)
Western Mineral Products Co., Minneapolis, Minn.
Wilson & Co., Inc., Chicago, Ill. (Board)
Wood Conversion Co., St. Paul, Minn.
Zonolite Co., Chicago, Ill. (Loose fill)

INSULATION, DUCT, SOUND DEADENING

For Application Inside Duct

Baldwin-Hill Co., Trenton, N. J.
Celotex Corp., The, Chicago, Ill.
Dry-Zero Corp., Chicago, Ill.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Felters Company, The, Boston, Mass.
●Grant Wilson, Inc., Chicago, Ill.
●Gustin Bacon Mfg. Co., Kansas City, Mo.
Insulite Div., Minnesota and Ontario Paper Co., Minneapolis, Minn.
Johns-Manville, New York, N. Y.
Keasbey Co., Robert A., New York, N. Y.
Kimberly-Clark Corp., Neenah, Wis.
Lockport Cotton Batting Co., Lockport, N. Y.
Mortell Co., J. W., Kankakee, Ill.
●Owens-Corning Fiberglas Corp., Toledo, O.
Stic-Klip Mfg. Co., Cambridge, Mass. (Insulation fasteners)
Telsit Insulation Co., Bronx, N. Y.
Thompson & Co., Oakmont, Pa.
United States Rubber Co., New York, N. Y.
Western Felt Works, Chicago, Ill.
Zonolite Co., Chicago, Ill.

INSULATION, DUCT, THERMAL

Acme Asbestos Covering & Flooring Co., Chicago, Ill. (Asbestos)
Air-O-Cel Co., Detroit, Mich.
Alfol Div., Reflectal Corp., New York, N. Y. (Aluminum foil)
American Flange & Mfg. Co., Inc., New York, N. Y.
American Hair & Felt Co., Chicago, Ill. (Hair felt)
●Armstrong Cork Co., Lancaster, Pa. (Corkboard)
Arrowhead Rubber Co., Downey, Calif.
Badham Insulation Co., Inc., Birmingham, Ala.
Baldwin-Hill Co., Trenton, N. J.
Bigelow Liptak Corp., Detroit, Mich.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O. (Asbestos)
Celotex Corp., The, Chicago, Ill.
Cork Import Corp., Englewood, N. J. (Corkboard)
Cork Insulation Co., Inc., New York, N. Y. (Corkboard)
Dry-Zero Corp., Chicago, Ill.
Eagle-Picher Co., Cincinnati, O. (Mineral wool blankets)
Ehret Magnesia Mfg. Co., Valley Forge, Pa. (Cork, magnesia, hair felt)
Felters Company, The, Boston, Mass. (Wool felt)
Fir-Tex Insulating Board Co., St. Helens, Ore. (Wood fibreboard)
General Insulating Products Co., Brooklyn, N. Y. (Acoustic rock wool)
●Grant Wilson Inc., Chicago, Ill.
●Gustin Bacon Mfg. Co., Kansas City, Mo.
Hinde & Dauch Paper Co., Sandusky, O.
●Infra Insulation, Inc., New York, N. Y.
Insulite Div. Minnesota and Ontario Paper Co., Minneapolis, Minn. (Wood fibre)
International Vermiculite Co., Girard, Ill. (Block)
Isoflex Corp., San Francisco, Calif.
Johns-Manville, New York, N. Y. (Rock cork, asbestos)
Kaylo Div., Owens-Illinois Glass Co., Toledo, O.
Keasbey Co., Robert A., New York, N. Y. (Asbestos and cork)
●Keasbey & Mattison Co., Ambler, Pa. (Asbestos)
Keystone Asphalt Products Co., Chicago, Ill.
Kimberly-Clark Corp., Neenah, Wis.
Lockport Cotton Batting Co., Lockport, N. Y.
Masonite Corp., Chicago, Ill.
Mineral Insulation Co., Chicago Ridge, Ill. (Rock wool)
Mortell Co., J. W., Kankakee, Ill.
●Mundet Cork Corp., North Bergen, N. J. (Cork)
Munn and Steele, Inc., South Boston, Mass.
Norristown Magnesia & Asbestos Co., Norristown, Pa. (Asbestos and wool felt)
●Owens-Corning Fiberglas Corp., Toledo, O. (Blanket)
Pabco Products Inc., San Francisco, Calif.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Pittsburgh Corning Corp., Pittsburgh, Pa.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Poe Co., C. W., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Reflectal Corp., New York, N. Y.
Refractory & Insulation Corp., New York, N. Y. (Block, blanket)
Reynolds Metals Co., Louisville, Ky.
Rock Fleece Co., El Paso, Tex.
Rubatex Div., Great American Industries, Inc., Bedford, Va.
Ruberoid Co., New York, N. Y. (Asbestos cellular and laminated sheets or blocks)
Sall Mountain Co., Chicago, Ill. (Asbestos)
Schundler & Co., Inc., F. E., Long Island City, N. Y.
Smith & Kanzler Corp., Linden, N. J. (Asbestos air cell type)
Sprayo-Flake Co., Chicago, Ill.
Standard Asbestos Mfg. Co., Chicago, Ill. (Asbestos, hair felt)
Stic-Klip Mfg. Co., Cambridge, Mass. (Insulation fasteners)
Telsit Insulation Co., Bronx, N. Y.
●Union Asbestos & Rubber Co., Cicero, Ill.
United Cork Companies, Kearny, N. J. (Cork)
United States Mineral Wool Co., South Milwaukee, Wis.
Western Felt Wks., Chicago, Ill. (Felt)
Wilson & Co., Inc., Chicago, Ill.
Wood Conversion Co., St. Paul, Minn.
Zonolite Co., Chicago, Ill. (plastic)

INSULATION FASTENERS

See Fasteners, Insulation

INSULATION, PIPE

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Alfol Div., Reflectal Corp., New York, N. Y. (Aluminum foil)
●American District Steam Co., North Tonawanda, N. Y. (Underground)
American Hair & Felt Co., Chicago, Ill.
●Armstrong Cork Co., Lancaster, Pa. (Cork)
Badham Insulation Co., Inc., Birmingham, Ala.
Baldwin-Hill Co., Trenton, N. J. (Rock wool)
Barrett Div., The, Allied Chemical & Dye Corp., New York, N. Y.
Bigelow Liptak Corp., Detroit, Mich.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O. (Asbestos, magnesia)
Cork Import Corp., Englewood, N. J. (Corkboard)
Cork Insulation Co., New York, N. Y. (cork)
●Durant Insulated Pipe Co., Palo Alto, Calif. (Underground)
Eagle-Picher Co., Cincinnati, O. (Mineral wool)
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Forty-Eight Insulations, Inc., Aurora, Ill.
●Grant Wilson Inc., Chicago, Ill.
Gro-Quick Co., Chicago, Ill. (glass fiber and flexible tape)
International Vermiculite Co., Girard, Ill. (Vermiculite)
Johns-Manville, New York, N. Y. (Asbestos, magnesia, rock cork)
Kaylo Div., Owens-Illinois Glass Co., Toledo, O.
Keasbey Co., Robert A., New York, N. Y. (Asbestos and cork)
●Keasbey & Mattison Co., Ambler, Pa. (Asbestos, magnesia)
Masonite Corp., Chicago, Ill.
Mortell Co., J. W., Kankakee, Ill. (plastic cork)
●Mundet Cork Corp., North Bergen, N. J. (Cork)
Munn and Steele, Inc., South Boston, Mass.
Mystik Adhesive Products Div., Chicago Show Printing Co., Chicago, Ill.

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National Gypsum Co., Buffalo, N. Y. (Moulded)
Norristown Magnesia & Asbestos Co., Norristown, Pa. (Asbestos, magnesia)
●Owens-Corning Fiberglas Corp., Toledo, O.
Pabco Products Inc., San Francisco, Calif.
Pacific States Felt Mfg. Co., Inc., San Francisco, Calif.
Pittsburgh Corning Corp., Pittsburgh, Pa.
Pittsburgh Corning Corp., Pittsburgh, Pa.
Poe Co., C. W., Cleveland, O.
●Porter & Co., Inc., H. W., Newark, N. J. (Underground)
Prestite Engineering Co., St. Louis, Mo.
Quigley Co., Inc., New York, N. Y. (asbestos lagging)
Reflectal Corp., New York, N. Y. (laminated aluminum foil and asbestos paper)
●Ric-wiL Co., Cleveland, O.
Robinson Industries, Coleman, Mich. (expanded plastic)
Rock Fleece Co., El Paso, Tex.
Ruberoid Co., New York, N. Y. (Asbestos, magnesia, calsilite)
Sall Mountain Co., Chicago, Ill. (Asbestos and wool felt)
Schundler & Co., Inc., F. E., Long Island City, N. Y.
Smith & Kanzler Corp., Linden, N. J. (Asbestos air cell, wool felt and hair felt)
Sponge Rubber Products Co., Shelton, Conn. (cellular rubber)
Standard Asbestos Mfg. Co., Chicago, Ill.
●Union Asbestos & Rubber Co., Cicero, Ill.
United Cork Companies, Kearny, N. J.
Walker Jamar Co., Duluth, Minn.
Western Mineral Products Co., Minneapolis, Minn. (Underground)
Wilson & Co., Chicago, Ill. (hairfelt)
Zonolite Co., Chicago, Ill. (underground)

IONIZATION APPARATUS

General Ozone Corp., Chicago, Ill.
Montgomery Bros., San Francisco, Calif.
United States Ozone Co. of America, Scottdale, Pa.
Welsbach Corp., The, Ozone Processes Div., Philadelphia, Pa.

IRON BODY VALVES

See Valves, Gate; and Valves, Globe

JACKETED PIPE

See Pipe, Jacketed

JACKETING FOR PIPE INSULATION

See Protectors, Pipe Covering

JETS, OVERFIRE AIR, FOR SMOKE ABATEMENT

Canton Stoker Corp., Canton, O.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Iron Fireman Mfg. Co., Cleveland, O.
Plibrico Jointless Firebrick Co., Chicago, Ill.
Power Engineering Co., Chicago, Ill.

JOINTS, PIPE, ELECTRICAL INSULATING

American Hard Rubber Co., New York, N. Y.
Barco Mfg. Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.

JOINTS, PIPE, EXPANSION, PACKLESS

●American District Steam Co., North Tonawanda, N. Y.
Badger Fire Extinguisher Co., Somerville, Mass.
●Badger Mfg. Co., Cambridge, Mass. (Corrugated copper, stainless steel)
Barco Mfg. Co., Chicago, Ill.
Chicago Metal Hose Corp., Maywood, Ill.
Cook Electric Co., Chicago, Ill.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Foster Wheeler Corp., New York, N. Y.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
Harris & Co., Arthur, Chicago, Ill.
Kopperman & Sons, Joseph, Philadelphia, Pa.
MagniLastic Div., Cook Electric Co., Chicago, Ill.
National Valve & Mfg. Co., Pittsburgh, Pa.
Northern Indiana Brass Co., Elkhart, Ind.
●Ric-wiL Co., Cleveland, O.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
Techniflex Corp., Port Jervis, N. Y.
United States Rubber Co., New York, N. Y.
●Zallea Brothers, Wilmington, Del.

JOINTS, PIPE, EXPANSION, SLIP

●American District Steam Co., North Tonawanda, N. Y.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Clow & Sons, James B., Chicago, Ill.
●Crane Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Howard Iron Works & Alberger Heater Div., Buffalo, N. Y.
●Illinois Engineering Co., Chicago, Ill.
Jarecki, Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Northern Indiana Brass Co., Elkhart, Ind.
Parks-Cramer Co., Fitchburg, Mass. (jacketed)
Powell Co., Wm., Cincinnati, O.
Schade Valve Mfg. Co., Philadelphia, Pa.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
United States Gasket Co., Camden, N. J.
●Walworth Co., New York, N. Y.
Warren Foundry & Pipe Corp., New York, N. Y.
●Webster & Co., Warren, Camden, N. J.
●Yarnall-Waring Co., Philadelphia, Pa.

JOINTS, PIPE, FLEXIBLE, SWING AND REVOLVING

Barco Mfg. Co., Chicago, Ill.
Bordo Co., Inc., L. J., Glenside, Pa.
Chiksan Co., Brea, Calif.
Crabb Engineering Co., Detroit, Mich.
Flexo Supply Co., Inc., St. Louis, Mo.
Gil-Lair Products, Inc., Pasadena, Calif.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Johnson Corp., The, Three Rivers, Mich.
Mayson Mfg. Co., Detroit, Mich.
Moran Flexible Joint Co., Inc., Louisville, Ky.
Patterson-Ballagh Corp., Los Angeles, Calif.
Powell Co., Wm., Cincinnati, O.
●Spraying Systems Co., Bellwood, Ill.

JOINTS, UNIVERSAL, FOR OPERATING VALVES

Blood Brothers Machine Co., Allegan, Mich.
Brooks Equipment Corp., Hoboken, N. J.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Consolidated Car-Heating Co., Inc., Albany, N. Y.
Lovejoy Flexible Coupling Co., Chicago, Ill.
Piezo Mfg. Corp., New York, N. Y.
Stow Mfg. Co., Binghamton, N. Y. (flexible shafts)

KATA THERMOMETERS

See Thermometers, Kata

LACQUERS

See Enamels and Lacquers

LAGGING ADHESIVES

See Adhesives, for Pipe Covering

LAMPS, STERILIZING, FOR DUCT INSTALLATION

Coleman-Petterson Corp., Cleveland, O.
General Electric Co., Lamp Dept., Cleveland, O.
Hanovia Chemical & Mfg. Co., Newark, N. J.
Lustra Corp. of America, Brooklyn, N. Y.
Westinghouse Electric Corp., Pittsburgh, Pa.

LEAD PIPE

See Pipe and Tubing, Lead and Lead Alloy

LEAD SHEETS

See Sheets, Lead

LEAD TUBING

See Pipe and Tubing, Lead and Lead Alloy

LEAK DETECTORS

See Detectors, Leak, Refrigerant

LEATHER BELTING

See Belting, Flat, Leather

LEATHER PACKING

See Packing, Leather

LIGHTS, PILOT AND SIGNAL

Benjamin Electric Mfg. Co., Des Plaines, Ill.
Cooper Co., Clark, Palmyra, N. J.
Dial Light Co. of America, Inc., New York, N. Y.
General Electric Co., Lamp Dept., Cleveland, O.
Hart Mfg. Co., The, Hartford, Conn.
Signal Indicator Co., New York, N. Y.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Westinghouse Electric Corp., Pittsburgh, Pa.

LINKS, FUSIBLE

●Grinnell Co., Inc., Providence, R. I.
Morse-Smith-Morse, Inc., Watertown, Mass.
Preferred Utilities Mfg. Corp., New York, N. Y.

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LIQUID LEVEL INDICATORS
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LIQUID LEVEL RECORDERS
See Recorders, Liquid Level

LIQUID LEVEL REGULATORS
See Regulators, Liquid Level

LIQUID PRESSURE REGULATORS
See Regulators, Pressure, Liquid

LOCATORS, PIPE, UNDERGROUND
Fisher Research Laboratory, Inc., Palo Alto, Calif.
Globe Phone Mfg. Co., Reading, Mass.
Wilkinson Products Co., Los Angeles, Calif.

LOCK FORMING MACHINES
See Machines, Pittsburgh Lock Forming

LOCK NUTS
See Nuts, Lock

LOUVERS AND SHUTTERS, AUTOMATICALLY OR MANUALLY CONTROLLED
●Air Conditioning Products Co., Detroit, Mich.
Air Control Products, Inc., Coopersville, Mich.
●Air & Refrigeration Corp., New York, N. Y.
Airecon Industries, Detroit, Mich.
Airmaster Corp., Chicago, Ill.
Allen Ventilator Div., Production Planning Co., Rochester, Mich.
American Coolair Corp., Jacksonville, Fla.
American Foundry & Furnace Co., Bloomington, Ill.
American Steel Band Co., Pittsburgh, Pa.
American Warming & Ventilating Co., Toledo, O.
Arex Co., Chicago, Ill.
Barber-Colman Co., Rockford, Ill.
Barnes Co., A. D., Dayton, O.
Belter Electric Mfg. Co., G. J., The, St. Louis, Mo.
Biersach & Niedermeyer Co., Milwaukee, Wis.
●Bishop & Babcock Mfg. Co., Cleveland, O.
●Buffalo Forge Co., Buffalo, N. Y.
Burt Mfg. Co., Akron, O.
Century Fan & Ventilator Co., Stamford, Conn.
Champion Blower & Forge Co., Lancaster, Pa.
Chelsea Fan & Blower Co., Inc., Plainfield, N. J.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
Commercialaire, Inc., Brooklyn, N. Y.
Conoflow Corp., Philadelphia, Pa.
Dana Fan & Blower Corp., Cincinnati, O.
●De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Decatur Iron & Steel Co., Decatur, Ala.
Dual-Air Fan Co., South Elgin, Ill.
Electrovent Fan & Mfg. Co., Chicago, Ill.
Elgo Shutter & Mfg. Co., Detroit, Mich.
Empire Ventilation Equipment Co., Long Island City, N. Y. (stationary)
●General Blower Co., Morton Grove, Ill.
Ilg Electric Ventilating Co., Chicago, Ill.
International Engineering, Inc., Dayton, O.
Jamieson Mfg. Co., Dallas, Tex.
Jordan & Co., Inc., Paul R., Indianapolis, Ind.
Kane Mfg. Corp., Kane, Pa.
King Co., The, Owatonna, Minn.
Lau Blower Co., Dayton, O.
Lockjoint Wood Products Co., Wichita, Kans. (Wood; stationary door, wall, window and ceiling)
Martin Fan & Blower Co., Chicago, Ill.
Maysteel Products, Inc., Milwaukee, Wis.
Meier Electric & Machine Co., Inc., Indianapolis, Ind.
Meyer Mfg. Co., Detroit, Mich.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Myers Electric Co., Inc., Pittsburgh, Pa.
●Nelson, Herman, Div., American Air Filter Co., Inc., Moline, Ill.
Peerless Electric Co., Warren, O.
Reed Unit-Fans, Inc., New Orleans, La.
●Register & Grille Mfg. Co., Brooklyn, N. Y.
Riggin Metal Products, Inc., Kankakee, Ill.
Robertson Co., H. H., Pittsburgh, Pa.
Schoedinger, F. O., Columbus, O.
Shallcross Controls, Inc., Milwaukee, Wis.
Signal Electric Mfg. Co., Menominee, Mich.
Sioux Steel Co., Sioux Falls, S. D.
Southbridge Roofing Co., Inc., Southbridge, Mass.
●Standard Stamping & Perforating Co., Chicago, Ill.
●Swartwout Co., Cleveland, O.
●Tuttle & Bailey, Inc., New Britain, Conn.
United States Gypsum Co., Chicago, Ill.
United States Register Co., Battle Creek, Mich.
Ino Ventilator Co., Cliftondale, Mass.
Utility Appliance Corp., Los Angeles, Calif.
Van Noorden Co., E., Boston, Mass.
Victor Electric Products, Inc., Cincinnati, O.
White & Sons, Inc., Wilfrid O., Boston, Mass.
●Wing Mfg. Co., L. J., Linden, N. J.

LOW WATER CUT-OFFS
See Cut-offs, Low Water, Heating Boiler

MACHINES, BALANCING
See Equipment, Balancing

MACHINES, BLUE PRINT AND WHITE PRINT
For Reproducing Engineering Drawings

American Photocopy Equipment Co., Chicago, Ill.
Bruning Co., Inc., Charles, Chicago, Ill.
Dietzgen Co., Eugene, Chicago, Ill.
Ozalid Div. of General Aniline & Film Corp., Johnson City, N. Y.
Paragon-Revolute Corp., Rochester, N. Y.
Pease Co., C. F., The, Chicago, Ill.
Peck & Harvey, Chicago, Ill.

MACHINES AND FILM, X-RAY
du Pont de Nemours & Co., E. I., Photo Products Dept., Wilmington, Del.
Eastman Kodak Co., Rochester, N. Y.
Kelley Koett Mfg. Co., The, Covington, Ky.
North American Philips Co., Inc., Mt. Vernon, N. Y.
Westinghouse Electric Corp., Pittsburgh, Pa.

MACHINES, PIPE CLEANING
American Wheelabrator & Equipment Corp., Mishawaka, Ind. (for preparation of surface prior to coating)
Continental Machine Co., Chicago, Ill.
Spartan Tool Co., Chicago, Ill.
Wilson, Inc., Thomas C., Long Island City, N. Y.

MACHINES, PIPE CUTTING AND THREADING, PORTABLE
American Die & Tool Co., Inc., Reading, Pa.
Beaver Pipe Tools, Inc., Warren, O.
Capewell Mfg. Co., Hartford, Conn.
Landis Machine Co., Inc., Waynesboro, Pa.
Muncie Gear Wks., Inc., Muncie, Ind.
Oster Mfg. Co., Cleveland, O.
Quijada Tool Co., Inc., Los Angeles, Calif.
●Ridge Tool Co., Elyria, O. (Hand)
Ter-I-Day Sales Co., Detroit, Mich.
Thread-Ezy Mfg. Co., Corunna, Mich.
Toledo Pipe Threading Machine Co., Toledo, O.

MACHINES, PIPE CUTTING AND THREADING, STATIONARY
Bignall & Keeler Div., John Ramming Machine Co., St. Louis, Mo.
Capewell Mfg. Co., Hartford, Conn.
Landis Machine Co., Inc., Waynesboro, Pa.
Obear, E. L., Los Angeles, Calif.
Oster Mfg. Co., Cleveland, O.
Quijada Tool Co., Inc., Los Angeles, Calif.
Saunders Machine & Tool Corp., Yonkers, N. Y.
Stratford Pipe Scalloper Machine Co., Stratford, Conn.
Toledo Pipe Threading Machine Co., Toledo, O.

MACHINES, PITTSBURGH LOCK FORMING
Dahlstrom Machine Works, Chicago, Ill.
Lockformer Co., Chicago, Ill.
Maplewood Machinery Co., Inc., Chicago, Ill.
Whitney Metal Tool Co., Rockford, Ill.

MACHINES, REFRIGERATION, ABSORPTION
Carrier Corp., Syracuse, N. Y.
Vogt Machine Co., Henry, Louisville, Ky.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeraton Div., Harrison, N. J.
York Corp., York, Pa.

MACHINES, SLIP ROLL FORMING
Altens Foundry & Machine Works, Inc., Lancaster, O.
Barth Mfg. Co., Milldale, Conn.
Hendley & Whittmore Co., Beloit, Wis.
Kling Bros. Engineering Wks., Chicago, Ill.
Milton Equipment Co., Philadelphia, Pa.
Niagara Machine & Tool Wks., Buffalo, N. Y.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Peck, Stow & Wilcox Co., Southington, Conn.
San Angelo Foundry & Machine Co., San Angelo, Tex.
Webb Corp., The, Webb City, Mo.
Wysong & Miles, Greensboro, N. C.

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MACHINES, TESTING, WELD

Air Reduction Sales Co., New York, N. Y.
Dillon Co., Inc., W. C., Forest Park, Ill.
Olsen Testing Machine Co., Tinius, Willow Grove, Pa.

MAGNESIUM ALLOY SHEETS

See Sheets, Magnesium Alloy

MAGNESIUM TUBING

See Tubing, Magnesium

MALLEABLE UNIONS

See Unions, Malleable

MANIFOLDS, REFRIGERATION

Ball Welding Works, Inc., Oakland, Calif.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
●Frick Co., Waynesboro, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
●Mueller Brass Co., Port Huron, Mich.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa.
Superior Valve and Fittings Co., Pittsburgh, Pa.
U. S. Pipe & Mfg. Co., San Francisco, Calif.
Vilter Mfg. Co., Milwaukee, Wis.
Weatherhead Co., Cleveland, O.
York Corp., York, Pa.

MANOMETERS

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Co., Chas. M., San Francisco, Calif.
Barton Instrument Corp., Los Angeles, Calif.
Bristol Co., The, Waterbury, Conn.
Builders-Providence Inc., Div. of Builders Iron Foundry, Providence, R. I.
Defender Instrument and Regulator Co., St. Louis, Mo.
●Dwyer Mfg. Co., F. W., Chicago, Ill.
●Hays Corp., Michigan City, Ind.
Hill, E. Vernon & Co., Chicago, Ill.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
King Engineering Corp., Ann Arbor, Mich.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Meriam Instrument Co., The, Cleveland, O.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Norwalk Valve Co., South Norwalk, Conn.
Precision Scientific Co., Chicago, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Refinite Corp., Omaha, Neb.
Republic Flow Meters Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Trimount Instrument Co., Chicago, Ill.
United States Gauge, Div. of American Machine and Metals, Inc., Sellersville, Pa.
Wallace & Tiernan Co., Inc., Newark, N. J.
Will Corp., Rochester, N. Y.

MECHANICAL DRIVE TURBINES

See Turbines, Mechanical Drive

MECHANICAL SPEED CHANGERS

See Changers, Speed, Mechanical

MECHANICAL TRAPS

See Traps, Steam, Mechanical

MERCURY SWITCHES

See Switches, Mercury

METAL HOSE

See Hose, Metal and Fittings

METAL, POROUS, FOR FILTRATION, SEPARATION, DIFFUSION AND FLOW CONTROL

Keystone Carbon Co., Inc., St. Marys, Pa.
Moraine Products Div., General Motors Corp., Dayton, O.

METALLIC BELLOWS

See Bellows, Thermostatic and Metallic

METALLIC PACKING

See Packing, Metallic

METERS, AIR VELOCITY, DIRECT READING

●Anemostat Corp. of America, New York, N. Y.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Hastings Instrument Co., Hampton, Va.
●Hays Corp., Michigan City, Ind.
Illinois Testing Laboratories, Inc., Chicago, Ill.
Taylor Instrument Companies, Rochester, N. Y.

METERS, BTU, FOR MEASURING FLOW AND TEMPERATURE AND CALIBRATED IN BTU OR THERMS

Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Foxboro, Mass.
Hagan Corp., Pittsburgh, Pa.

METERS, CONDENSATION

●American District Steam Co., North Tonawanda, N. Y.
Buffalo Meter Co., Buffalo, N. Y.
Central Station Steam Co., Detroit, Mich.
Neptune Meter Co., New York, N. Y.

METERS, FLOW, REFRIGERANT

Bailey Meter Co., Cleveland, O.
Barton Instrument Corp., Los Angeles, Calif.
Bristol Co., The, Waterbury, Conn.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
●Hays Corp., Michigan City, Ind.
Moore Products Co., Philadelphia, Pa.
Neptune Meter Co., New York, N. Y.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Trimount Instrument Co., Chicago, Ill.
United States Gauge, Div. of America Machine and Metals, Inc., Sellersville, Pa.

METERS, FLOW, STEAM

●American District Steam Co., North Tonawanda, N. Y.
American Meter Co., Inc., New York, N. Y.
Bailey Meter Co., Cleveland, O.
Barton Instrument Corp., Los Angeles, Calif.
Bristol Co., The, Waterbury, Conn.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Meriam Instrument Co., The, Cleveland, O.
Minneapolis-Honeywell Regulator Co., Instrument Div., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
●Taylor Instrument Companies, Rochester, N. Y.
Trimount Instrument Co., Chicago, Ill.

METERS, PROCESS LIQUID

American Meter Co., Inc., New York, N. Y.
Bailey Meter Co., Cleveland, O.
Barton Instrument Corp., Los Angeles, Calif.
Bowser, Inc., Fort Wayne, Ind.
Bristol Co., The, Waterbury, Conn.
Buffalo Meter Co., Buffalo, N. Y.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
Meriam Instrument Co., The, Cleveland, O.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moore Products Co., Philadelphia, Pa.
Neptune Meter Co., New York, N. Y.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Pittsburgh Equitable Meter Div., Rockwell Mfg. Co., Pittsburgh, Pa.
Republic Flow Meters Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Taylor Instrument Companies, Rochester, N. Y.
Trimount Instrument Co., Chicago, Ill.
Worthington-Gamon Meter Co., Newark, N. J.

METERS, VOLUME, AIR AND GAS

American Meter Co., Inc., New York, N. Y.
Bristol Co., The, Waterbury, Conn.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Hagan Corp., Pittsburgh, Pa.
Hastings Instrument Co., Hampton, Va.

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●Hays Corp., Michigan City, Ind.
Meriam Instrument Co., The, Cleveland, O.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Pittsburgh Equitable Meter Div., Rockwell Mfg. Co., Pittsburgh, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.
Schutte & Koerting Co., Philadelphia, Pa.
Selas Corp. of America, Philadephia, Pa.
Taylor Instrument Companies, Rochester, N. Y.
Wallace & Tiernan Co., Inc., Newark, N. J.

METERS, WATER

Bailey Meter Co., Cleveland, O.
Buffalo Meter Co., Buffalo, N. Y.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Hagan Corp., Pittsburgh, Pa.
Hersey Mfg. Co., South Boston, Mass.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
National Meter Co., Brooklyn, N. Y.
Neptune Meter Co., New York, N. Y.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Pfening Co., Fred D., Columbus, O. (batch measuring)
Pittsburgh Equitable Meter Div., Rockwell Mfg. Co., Pittsburgh, Pa.
Republic Flow Meters Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Union Water Meter Co., Worcester, Mass.
Worthington-Gamon Meter Co., Newark, N. J.

MIXING VALVES

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MODULATING VALVES

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MOTOR BASES

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MOTOR CONTROLLERS

See Controllers and Starters, Motor

MOTOR OPERATED VALVES

See Valves, Motor Operated

MOTOR STARTERS

See Controllers and Starters, Motor

MOTORS, ELECTRIC, FRACTIONAL HP

Abart Gear & Machine Co., Chicago, Ill.
Ace Electric Corp., Bedford, Ind.
Alliance Mfg. Co., Alliance, O. (Shaded pole)
●Baldor Electric Co., St. Louis, Mo.
Barber-Colman Co., Rockford, Ill.
Bodine Electric Co., Chicago, Ill.
Brown-Brockmeyer Co., Inc., Dayton, O.
Burke Electric Co., Div. of Marathon Electric Mfg. Corp., Erie, Pa.
Canatsey Electric Mfg. Co., Kansas City, Mo.
●Century Electric Co., St. Louis, Mo.
Crise Mfg. Co., The, Columbus, O.
Delco Appliance Div., General Motors Corp., Rochester, N. Y.
Delco Products Div., General Motors Corp., Dayton, O.
Diehl Mfg. Co., Somerville, N. J.
Eastern Air Devices, Inc., Brooklyn, N. Y.
Electric Auto-Lite Co., Instrumeht & Gauge Div., Toledo, O.
Electric Motor Corp., Div. of Howard Industries, Inc., Racine, Wis.
Emerson Electric Mfg. Co., The, St. Louis, Mo.
Fasco Industries, Inc., Rochester, N. Y.
Fairbanks, Morse & Co., Chicago, Ill.
Franklin Electric Co., Inc., Bluffton, Ind.
General Die and Stamping Co., New York, N. Y.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Hansen Mfg. Co., Inc., Princeton, Ind.
Hoover Co., Kingston-Conley Div., North Plainfield, N. J.
Howell Electric Motors Co., Howell, Mich.
Jack & Heintz Precision Industries, Inc., Cleveland, O.
Kraus Co., Walter S., Woodside, L. I., N. Y.
Lamb Electric Co., Kent, O.
Leland Electric Co., The, Dayton, O.
Lima Electric Motor Co., The, Lima, O.
Marathon Electric Mfg. Corp., Wausau, Wis.
Master Electric Co., Dayton, O.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
●Moore Co., The, Marceline, Mo. (Slow speed fan motors)
Ohio Electric Mfg. Co., Cleveland, O.
Peerless Electric Co., Warren, O.
Portable Electric Tools, Inc., Chicago, Ill.
Redmond Co., Inc., Owosso, Mich.
Reynolds Electric Co., River Grove, Ill.
Ripley Co., Inc., Middletown, Conn.
Robbins & Myers, Inc., Springfield, O.
Rotor Corp., Miamisburg, O.
Royal Mfg. Corp., Waterloo, Ind.
Reuland Electric Co., Alhambra, Calif.
●Russell Electric Co., Chicago, Ill.
Signal Electric Mfg. Co., Menominee, Mich.
Small Motors Inc., Chicago, Ill.
Smith Corp., A. O., Milwaukee, Wis.
Speedway Mfg. Co., Chicago (Cicero), Ill.
Sutton Corp., O. A., Wichita, Kan.
Torq Electric Mfg. Corp., Bedford, O.
U. S. Electrical Motors, Inc., Los Angeles, Calif.
Victor Electric Products, Inc., Cincinnati, O.
●Wagner Electric Corp., St. Louis, Mo.
Westinghouse Electric Corp., Pittsburgh, Pa.
Whirlaway Motors, Inc., Tipp City, O.

MOTORS, ELECTRIC, 1 HP AND OVER

Abart Gear & Machine Co., Chicago, Ill.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Allis Co., Louis, The, Milwaukee, Wis.
●Baldor Electric Co., St. Louis, Mo.
Bogue Electric Co., Paterson, N. J.
Brown-Brockmeyer Co., Inc., Dayton, O.
Burke Electric Co., Div. of Marathon Electric Mfg. Corp., Erie, Pa.
●Century Electric Co., St. Louis, Mo.
Continental Electric Co., Inc., Newark, N. J.
●Crocker-Wheeler Div., Elliott Co., Ampere, N. J.
Delco Products Div., General Motors Corp., Dayton, O.
Diehl Mfg. Co., Somerville, N. J.
Electric Machinery Mfg. Co., Minneapolis, Minn.
Electro Dynamic, Div. of the Electric Boat Co., Bayonne, N. J.
Emerson Electric Mfg. Co., The, St. Louis, Mo.
Fairbanks, Morse & Co., Chicago, Ill.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Hertner Electric Co., The, Cleveland, O.
Hoover Co., Kingston-Conley Div., North Plainfield, N. J.
Howell Electric Motors Co., Howell, Mich.
Ideal Electric & Mfg. Co., Mansfield, O.
Imperial Electric Co., Akron, O.
Jackson Co., Byron, Los Angeles, Calif. (Submersible)
Kraus Co., Walter S., Woodside, L. I., N. Y.
Leland Electric Co., The, Dayton, O.
Lima Electric Motor Co., The, Lima, O.
Marathon Electric Mfg. Corp., Wausau, Wis.
Marble-Card Electric Co., Gladstone, Mich.
Master Electric Co., Dayton, O.
●Moore Co., The, Marceline, Mo. (Slow speed fan motors)
Peerless Electric Co., Warren, O.
Reliance Electric & Engineering Co., Cleveland, O.
Reuland Electric Co., Alhambra, Calif.
Robbins & Myers, Inc., Springfield, O.
Smith Corp., A. O., Milwaukee, Wis.
Star-Kimball Electric Co., Bloomfield, N. J.
Sterling Electric Motors, Inc., Los Angeles, Calif.
U. S. Electrical Motors, Inc., Los Angeles, Calif.
●Wagner Electric Corp., St. Louis, Mo.
Westinghouse Electric Corp., Pittsburgh, Pa.
Whirlaway Motors, Inc., Tipp City, O.

MOUNTINGS, VIBRATION

See Bases and Pads, Vibration Isolating

MUFFLERS, HOT GAS, FOR REFRIGERANT LINES

Armstrong Co., Richard M., West Chester, Pa.

MUSHROOM VENTILATORS

See Ventilators, Mushroom

NEUTRALIZERS, ACID

See Dehydrant and Acid Neutralizer

NEUTRALIZERS, ODOR

See Adsorbers, Odor

NICKEL AND NICKEL ALLOY PIPE AND FITTINGS

See Tubing, Nickel and Alloy; Fittings, Pipe, Nickel and Nickel Alloy; Pipe, Nickel and Nickel Alloy

NICKEL AND NICKEL ALLOY SHEETS

See Sheets, Nickel and Nickel Alloy

NIPPLES, PIPE, BRASS AND COPPER

Acheson Mfg. Co., Rankin, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Nipple Mfg. Co., Cicero, Ill.
Columbus Mfg. & Supply Co., Columbus, O.
Couplings Co., Chicago, Ill.
●Crane Co., Chicago, Ill.
Ellsworth Pipe & Supply Co., Milwaukee, Wis.
G & H Mfg. Co., Philadelphia, Pa.
Grabler Mfg. Co., Cleveland, O.
Imperial Brass Mfg. Co., Chicago, Ill.
Keeney Mfg. Co., Newington, Conn.
Lunkenheimer Co., Cincinnati, O.
●Mueller Brass Co., Port Huron, Mich.
Parker Appliance Co., The, Cleveland, O.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.

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Star Tubular Products Co., Chicago, Ill.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
Ware Coupling & Nipple Co., Ware, Mass.
Weatherhead Co., Cleveland, O.

NIPPLES, PIPE, FLEXIBLE

Bendix Aviation Corp., Eclipse-Pioneer Div., Teterboro, N. J.
●Davis Engineering Corp., Elizabeth, N. J.
Lindy Heaters, Inc., New York, N. Y.
Techniflex Corp., Port Jervis, N. Y.

NIPPLES, PIPE, IRON AND STEEL

Alabama Pipe Co., Anniston, Ala. (Cast iron)
Alloy Steel Products Co., Linden, N. J. (Stainless steel)
Byers Co., A. M., Pittsburgh, Pa. (Wrought iron)
Chicago Nipple Mfg. Co., Cicero, Ill.
Clow & Sons, James B., Chicago, Ill.
Columbus Mfg. & Supply Co., Columbus, O.
●Crane Co., Chicago, Ill.
Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa. (Swage)
Ellsworth Pipe & Supply Co., Milwaukee, Wis.
Flori Pipe Co., The, St. Louis, Mo.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis. (Stainless steel and alloy only)
Illinois Malleable Iron Co., Chicago, Ill.
Larkin Packer Co., St. Louis, Mo.
Penn Mfg. Corp. of Washington, Pa., Washington, Pa.
Star Tubular Products Co., Chicago, Ill.
Union Malleable Mfg. Co., Ashland, O.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
Ware Coupling & Nipple Co., Ware, Mass.
Wheeling Machine Products Co., Wheeling, W. Va.

NIPPLES, PIPE, NICKEL AND NICKEL ALLOY

Cooper Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Flori Pipe Co., The, St. Louis, Mo.
International Nickel Co., Inc., The, New York, N. Y.

NIPPLES, RADIATOR, SLIP AND SCREW

Plumb Mfg. Co., Utica, N. Y.

NOISE ELIMINATION FOR COOLING TOWERS

●Industrial Sound Control, Inc., Hartford, Conn., and Los Angeles, Calif.

NOISE ELIMINATORS

See Bases and Pads, Vibration Isolating; Hose, Metal and Fittings; Insulation, Sound Deadening

NOZZLES, ATOMIZING

Bahnson Co., Winston-Salem, N. C.
Benjamin Air Rifle Co., St. Louis, Mo.
Bete Fog Nozzle Inc., Greenfield, Mass.
●Binks Mfg. Co., Chicago, Ill.
●Delavan Mfg. Co., Des Moines, Ia.
●Maid-O'-Mist, Inc., Chicago, Ill.
●Marley Co., Inc., The, Kansas City, Kans.
Martocello & Co., Jos. A., Philadelphia, Pa.
Parks-Cramer Co., Fitchburg, Mass.
Ross Sprinkler Co., Pasadena, Calif.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Somerville, Mass.
●Spraying Systems Co., Bellwood, Ill.
Supreme Electric Products Corp., Rochester, N. Y.
Water Cooling Corp., New York, N. Y.

NOZZLES, FLOODING

●Marley Co., Inc., The, Kansas City, Kans.
●Spraying Systems Co., Bellwood, Ill.
Water Cooling Corp., New York, N. Y.

NOZZLES, SPARGER, FOR TANK HEATING

Schutte & Koerting Co., Philadelphia, Pa.

NOZZLES, SPRAY

American Cooling Tower Co., Kansas City, Mo.
●April Showers Co., Inc., Washington, D. C.
Bahnson Co., Winston-Salem, N. C.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Bayley Blower Co., Milwaukee, Wis.
Benjamin Air Rifle Co., St. Louis, Mo.
●Bete Fog Nozzle Inc., Greenfield, Mass.
●Binks Mfg. Co., Chicago, Ill.
Black Mfg. Co., The, Baltimore, Md.
Blower Application Co., Milwaukee, Wis.
Buensod-Stacey, Inc., New York, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
Chain Belt Co., Milwaukee, Wis.
●Clarage Fan Co., Kalamazoo, Mich.
●Delavan Mfg. Co., Des Moines, Ia.
Dustlix Corp., Milwaukee, Wis.
Eclipse Air Brush Co., Inc., Newark, N. J.
Electric Sprayit Co., The, Sheboygan, Wis.
Fluor Corp., Ltd., The, Los Angeles, Calif.
●Grinnell Co., Inc., Providence, R. I.
Harry Cooling Towers, Inc., New York, N. Y.
International Moistening Co., Providence, R. I.
Leinweber Aluminum Nozzles, Chicago, Ill.
Link-Belt Co., Chicago, Ill.
●Maid-O'-Mist, Inc., Chicago, Ill.
●Marley Co., Inc., The, Kansas City, Kans.
Martocello & Co., Jos. A., Philadelphia, Pa.
Monarch Mfg. Wks., Inc., Philadelphia, Pa.
National Engineering & Mfg. Co., Kansas City, Mo.
Parks-Cramer Co., Fitchburg, Mass.
●Phillips Cooling Tower Co., Inc., Brooklyn, N. Y.
Plummer Spray Equipment Co., Napoleon, O.
●Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Rega Mfg. Co., Rochester, N. Y.
Rockwood Sprinkler Co., Worcester, Mass.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Ross Sprinkler Co., Pasadena, Calif.
Schutte & Koerting Co., Philadelphia, Pa.
Skinner Irrigation Co., Troy, O.
Spray Engineering Co., Somerville, Mass.
●Spraying Systems Co., Bellwood, Ill.
Supreme Electric Products Corp., Rochester, N. Y.
Thermal Industries, Indio, Calif.
Water Cooling Corp., New York, N. Y.
Water Cooling Equipment Corp., St. Louis, Mo.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Yarnall-Waring Co., Philadelphia, Pa.

NUTS, LOCK

Chase Brass & Copper Co., Waterbury, Conn.
●Crane Co., Chicago, Ill.
Dzus Fastener Co., Inc., Babylon, N. Y.
Elastic Stop Nut Corp. of America, Union, N. J.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
●Grinnell Co., Inc., Providence, R. I.
Grip Nut Co., Chicago, Ill.
Industrial Screw Co., Chicago, Ill.
Kwikon Co., Chicago, Ill.
Lamson & Sessions Co., Cleveland, O.
Locknut Corp. of America, Chicago, Ill.
MacLean-Fogg Lock Nut Co., Chicago, Ill.
Palnut Co., Irvington, N. J.
Republic Steel Corp., Bolt & Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
●SKF Industries, Inc., Philadelphia, Pa.
Shakeproof, Inc., Chicago, Ill. (Lock washers)
Standard Pressed Steel Co., Jenkintown, Pa.
Stockham Valves & Fittings, Birmingham, Ala.
Swallow Airplane Co., Wichita, Kan.
Tinnerman Products, Inc., Cleveland, O.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.

OBSERVATION BOILER PORTS

See Ports, Observation, Boiler

ODOR ADSORBERS

See Filters, Air; Adsorbers, Odor

ODOR NEUTRALIZERS

See Adsorbers, Odor; Compounds, Air Freshening

OIL BURNERS

See Burners, Oil

OIL COOLERS

See Coolers, Oil

OIL, REFRIGERATION

Ansul Chemical Co., Refrigeration Div., Marinette, Wis.
Frick Co., Waynesboro, Pa.
Gulf Oil Corp., Pittsburgh, Pa.
Houghton & Co., E. F., Philadelphia, Pa.
Shell Oil Co., Lubricants Dept., New York, N. Y.
Socony-Vacuum Oil Co., Inc., New York, N. Y.
Standard Oil Co. of California, Los Angeles, Calif.
Standard Oil Co. of Indiana, Chicago, Ill.
Sun Oil Co., Philadelphia, Pa.
Texas Co., The, New York, N. Y.
York Corp., York, Pa.

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OIL SEPARATORS

See Separators, Steam and Oil

OPERATORS, DAMPER, DUCT

A-P Controls Corp., Milwaukee, Wis.
Arens Controls, Inc., Chicago, Ill.
Autempco Corp., New York, N. Y.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Barber-Colman Co., Rockford, Ill.
Bristol Co., The, Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Conoflow Corp., Philadelphia, Pa.
Hagan Corp., Pittsburgh, Pa.
Hart & Cooley Mfg. Co., Holland, Mich.
●Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., North Bergen, N. J.
Mason-Neilan Regulator Co., Boston, Mass.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Perfex Corp., Milwaukee, Wis.
●Powers Regulator Co., Chicago, Ill.
Sampsel Time Control, Inc., Spring Valley, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.
Shallcross Controls, Inc., Milwaukee, Wis.
Tagliabue Instruments, Div., Weston Electrical Instrument Corp., Newark, N. J.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Taylor Instrument Companies, Rochester, N. Y.
Young Regulator Co., Cleveland, O.

OPERATORS, VALVE

Autempco Corp., New York, N. Y.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Babbitt Steam Specialty Co., New Bedford, Mass.
Barber-Colman Co., Rockford, Ill.
Bristol Co., The, Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Foxboro Co., Foxboro, Mass.
●General Controls Co., Glendale, Calif.
Grove Regulator Co., Oakland, Calif.
Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
●Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., North Bergen, N. J.
Mason-Neilan Regulator Co., Boston, Mass.
●McDonnell & Miller, Inc., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Perfex Corp., Milwaukee, Wis.
Philadelphia Gear Works, Inc., Philadelphia, Pa.
●Powers Regulator Co., Chicago, Ill.
Shallcross Controls, Inc., Milwaukee, Wis.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.

ORIFICE FLANGES

See Flanges, Orifice

ORIFICE UNIONS

See Unions, Orifice

ORIFICES, RADIATOR

Autempco Corp., New York, N. Y.
●Barnes & Jones, Inc., Boston, Mass.
Cashin Co., W. D., Boston, Mass.
●Dunham Co., C. A., Chicago, Ill.
●Illinois Engineering Co., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
New York Air Valve Corp., Brooklyn, N. Y.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Tallmadge, Webster, Systems, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Thrush & Co., H. A., Peru, Ind.
●Webster & Co., Warren, Camden, N. J.

OVERFIRE AIR JETS

See Jets, Overfire Air, for Smoke Abatement

OVER-PRESSURE UNLOADERS, FOR REFRIGERANTS

Black-Sivalls & Bryson, Inc., Kansas City, Mo.
●Henry Valve Co., Melrose Park, Ill.

OZONE APPARATUS

General Ozone Corp., Chicago, Ill.
Montgomery Bros., San Francisco, Calif.
Ozone Air Co., Grand Rapids, Mich.
United States Ozone Co. of America, Scottdale, Pa.
Welsbach Corp., The, Ozone Processes Div., Philadelphia, Pa.

PACKAGED HEAT PUMP UNITS

See Unit, Air Conditioning, Reverse Refrigeration Cycle

PACKAGED STEAM GENERATORS

See Boilers, Steam Generating Units, Heating and Process

PACKING, ASBESTOS

Acme Asbestos Covering & Flooring Co., Chicago, Ill.
Allpax Co., Inc., Mamaroneck, N. Y.
Anchor Packing Co., Philadelphia, Pa.
Austin-Mason Co., Everett, Mass.
Belmont Packing & Rubber Co., The, Philadelphia, Pa.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Chicago Specialty Mfg. Co., Chicago, Ill.
Crane Packing Co., Chicago, Ill.
Darcoid Co., Inc., New York, N. Y.
Durabla Mfg. Co., New York, N. Y.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Felt Products Mfg. Co., Chicago, Ill.
Garlock Packing Co., Palmyra, N. Y.
Gatke Corp., Chicago, Ill.
Goodyear Tire & Rubber Co., Akron, O.
●Grant Wilson Inc., Chicago, Ill.
Greene, Tweed & Co., North Wales, Pa.
Johns-Manville, New York, N. Y.
Keasbey Co., Robert A., New York, N. Y.
●Keasbey & Mattison Co., Ambler, Pa.
Klingerit, Inc., New York, N. Y. (Sheet and rod)
Linear Incorporated, Philadelphia, Pa.
Metallo Gasket Co., New Brunswick, N. J.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Q-P Mfg. Co., Needham Heights, Mass.
Quaker Rubber Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Passaic, N. J.
Sall Mountain Co., Chicago, Ill.
●Union Asbestos & Rubber Co., Cicero, Ill.
United States Rubber Co., New York, N. Y.
Zimmerman Packing Co., Cincinnati, O.

PACKING, FIBER

American Felt Co., Glenville, Conn.
Anchor Packing Co., Philadelphia, Pa.
●Armstrong Cork Co., Lancaster, Pa.
Austin-Mason Co., Everett, Mass.
Belmont Packing & Rubber Co., The, Philadelphia, Pa.
Crane Packing Co., Chicago, Ill.
Darcoid Co., Inc., New York, N. Y.
Durabla Mfg. Co., New York, N. Y.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Endura Mfg. Corp., Quakertown, Pa.
Garlock Packing Co., Palmyra, N. Y.
Greene, Tweed & Co., North Wales, Pa.
Johns-Manville, New York, N. Y.
Keasbey Co., Robert A., New York, N. Y.
Linear Incorporated, Philadelphia, Pa.
Metallo Gasket Co., New Brunswick, N. J.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Products Research Co., Los Angeles, Calif.
Quaker Rubber Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Passaic, N. J.
●Union Asbestos & Rubber Co., Cicero, Ill.
United States Rubber Co., New York, N. Y.
Zimmerman Packing Co., Cincinnati, O.

PACKING, LEATHER

Alexander Bros., Philadelphia, Pa.
Anchor Packing Co., Philadelphia, Pa.
Baldwin Belting, Inc., New York, N. Y.
Belmont Packing & Rubber Co., The, Philadelphia, Pa.
Chicago Belting Co., Chicago, Ill.
Davis & Co., Wayne, Westboro, Mass.
Excelsior Leather Washer Mfg. Co., Rockford, Ill.
Graton & Knight Co., Worcester, Mass.
Houghton & Co., E. F., Philadelphia, Pa.
Q-P Mfg. Co., Needham Heights, Mass.
Rhoads & Sons, J. E., Philadelphia, Pa.
Schieren Co., Chas. A., New York, N. Y.
Williams & Son, I. B., Dover, N. H.
Zimmerman Packing Co., Cincinnati, O.

PACKING, METALLIC

Allpax Co., Inc., Mamaroneck, N. Y.
Anchor Packing Co., Philadelphia, Pa.
Austin-Mason Co., Everett, Mass.
Belmont Packing & Rubber Co., The, Philadelphia, Pa.
Conneaut Plastic Metallic Packing Co., Conneaut, O.
Crane Packing Co., Chicago, Ill.
Darcoid Co., Inc., New York, N. Y.
Felt Products Mfg. Co., Chicago, Ill.
Flexrock Co., Philadelphia, Pa.

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France Packing Co., Philadelphia, Pa.
Garlock Packing Co., Palmyra, N. Y.
Greene, Tweed & Co., North Wales, Pa.
Johns-Manville, New York, N. Y.
Klingerit, Inc., New York, N. Y. (Sheet & rod)
Linear Incorporated, Philadelphia, Pa.
National Engineering Products Inc., Washington, D. C.
National Lead Co., New York, N. Y.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Q-P Mfg. Co., Needham Heights, Mass.
Quaker Rubber Corp., Philadelphia, Pa.
●Union Asbestos & Rubber Co., Cicero, Ill.
United States Rubber Co., New York, N. Y.
Zimmerman Packing Co., Cincinnati, O.

PACKING, RUBBER AND SYNTHETIC

American Felt Co., Glenville, Conn.
Anchor Packing Co., Philadelphia, Pa.
●Armstrong Cork Co., Lancaster, Pa.
Arrowhead Rubber Co., Downey, Calif.
Austin-Mason Co., Everett, Mass.
Belmont Packing & Rubber Co., The, Philadelphia, Pa.
Boston Woven Hose & Rubber Co., Cambridge, Mass.
Chicago Belting Co., Chicago, Ill.
Chicago Specialty Mfg. Co., Chicago, Ill.
Continental Rubber Wks., Erie, Pa.
Crane Packing Co., Chicago, Ill.
Darcoid Co., Inc., New York, N. Y.
Dow Corning Corp., Midland, Mich.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Felt Products Mfg. Co., Chicago, Ill.
Firestone Industrial Products Co., Akron, O.
Garlock Packing Co., Palmyra, N. Y.
Gates Rubber Co., Denver, Colo.
General Electric Co., Chemical Dept., Pittsfield, Mass.
Gil-Lair Products, Inc., Pasadena, Calif.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Graton & Knight Co., Worcester, Mass.
Greene, Tweed & Co., North Wales, Pa.
Hamilton Rubber Mfg. Corp., Trenton, N. J.
Houghton & Co., E. F., Philadelphia, Pa.
Johns-Manville, New York, N. Y.
Linear Incorporated, Philadelphia, Pa.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Products Research Co., Los Angeles, Calif.
Q-P Mfg. Co., Needham Heights, Mass.
Quaker Rubber Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Passaic, N. J.
Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, O.
Resistoflex Corp., Belleville, N. J.
Thermoid Co., Trenton, N. J.
United States Gasket Co., Camden, N. J.
United States Rubber Co., New York, N. Y.
United States Stoneware Co., New York, N. Y.
Zimmerman Packing Co., Cincinnati, O.

PANEL BOARDS

See Boards, Panel and Control

PANELS, PERFORATED, FOR AIR DIFFUSION

●Multi-Vent Div., Pyle-National Co., The, Chicago, Ill.
Simplex Ceiling Corp., New York, N. Y.

PARTS FOR HEATING AND AIR CONDITIONING EQUIPMENT

Ackermann Mfg. Co., Wheeling, W. Va.
Air & Refrigeration Corp., New York, N. Y. (insulated panels)
American Welding & Mfg. Co., Warren, O.
●Atlas Mfg. Co., St. Paul, Minn. (cabinets for unit air conditioners)
Berger Mfg. Div., Republic Steel Corp., Canton, O. (cabinets, housings, canopies)
Camloc Fastener Corp., New York, N. Y. (Fasteners for access panels and sheet metal)
Carey Mfg. Co., Philip, Lockland, Cincinnati, O. (Insulating panel for housing and duct construction)
Cincinnati Metalcrafts Inc., Cincinnati, O. (sheet metal fabricating)
Commercial Shearing & Stamping Co., Youngstown, O.
Detroit Stamping Co., Detroit, Mich.
Dover Metal Products Co., The, Canal Fulton, O.
Falstrom Co., Passaic, N. J. (Air conditioning cabinets, steel control panels)
Lindsay Structure, Inc., Skokie, Ill. (Cabinet construction for air conditioning and warm air heating equipment)
●Mueller Brass Co., Port Huron, Mich. (Specially fabricated copper tubing, machine formed tubes)
South Chester Co., South Chester, Pa. (blind rivets, panel fasteners, adjustable pawl fasteners, door retaining springs)
Rigidized Metals Corp., Buffalo, N. Y.

PILLOW BLOCK BEARINGS

See Bearings, Pillow Block

PILOT LIGHTS

See Lights, Pilot and Signal

PIPE, ALUMINUM

Aluminum Co. of America, Pittsburgh, Pa.
Colonial Alloy Co., Metals Div., Philadelphia, Pa.
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
●Revere Copper & Brass, Inc., New York, N. Y.
Reynolds Metals Co., Louisville, Ky.

PIPE, ASBESTOS FIBER AND CEMENT

Johns-Manville, New York, N. Y.
●Keasbey & Mattison Co., Ambler, Pa.
United States Stoneware Co., New York, N. Y.

PIPE BENDERS

See Benders, Pipe

PIPE, BRASS AND COPPER

American Brass Co., Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Hussey & Co., C. G., Pittsburgh, Pa.
Lewin-Mathes Co., Lewin Metals Div., St. Louis, Mo.
●Mueller Brass Co., Port Huron, Mich.
Phelps Dodge Copper Products Corp., British American Tube Div., New York, N. Y.
Reading Tube Corp., Long Island City, N. Y.
●Revere Copper and Brass, Incorporated, New York, N. Y.
Viking Copper Tube Co., Cleveland, O.
●Wolverine Tube Div., Calumet and Hecla Consolidated Copper Co., Detroit, Mich.

PIPE, CAST IRON, PRESSURE, BELL AND SPIGOT

Alabama Pipe Co., Anniston, Ala.
American Cast Iron Pipe Co., Birmingham, Ala.
Central Foundry Co., New York, N. Y.
Clow & Sons, James B., Chicago, Ill.
Duriron Co., Inc., Dayton, O. (Acid resisting)
Inner-Tite Div. of Yara Engineering Corp., Elizabeth, N. J.
Lynchburg Foundry Co., Lynchburg, Va.
McWane Cast Iron Pipe Co., Birmingham, Ala.
Somerville Iron Works, Somerville, N. J.
United States Pipe & Foundry Co., Burlington, N. J.
Warren Foundry & Pipe Corp., New York, N. Y.

PIPE, CAST IRON, PRESSURE, FLANGED

Alabama Pipe Co., Anniston, Ala.
American Cast Iron Pipe Co., Birmingham, Ala.
Clow & Sons, James B., Chicago, Ill.
Duriron Co., Inc., Dayton, O. (Acid resisting)
Inner-Tite Div. of Yara Engineering Corp., Elizabeth, N. J.
Lynchburg Foundry Co., Lynchburg, Va.
McWane Cast Iron Pipe Co., Birmingham, Ala.
United States Pipe & Foundry Co., Burlington, N. J.
Warren Foundry & Pipe Corp., New York, N. Y.

PIPE, CAST IRON, THREADED

Alabama Pipe Co., Anniston, Ala.
American Cast Iron Pipe Co., Birmingham, Ala.
Clow & Sons, James B., Chicago, Ill.
McWane Cast Iron Pipe Co., Birmingham, Ala.
Somerville Iron Wks., Somerville, N. J.
United States Pipe & Foundry Co., Burlington, N. J.
Warren Foundry & Pipe Corp., New York, N. Y.

PIPE CLEANING COMPOUNDS

See Compounds, Cleaning, Pipe Coil and Condenser

PIPE COILS

See Coils, Pipe

PIPE COUPLINGS

See Couplings, Pipe

PIPE COVERING, ADHESIVES

See Adhesives, for Pipe Covering

PIPE CUTTERS

See Cutters

PIPE CUTTING MACHINES

See Machines, Pipe Cutting and Threading

PIPE EXTRACTORS

See Extractors, Pipe

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PIPE, FIBER

Brown Co., New York, N. Y.
Orangeburg Mfg. Co., Orangeburg, N. Y.

PIPE AND FITTINGS, GAS VENT AND FLUE

Condensation Engineering Corp., Chicago, Ill.
Enderle, Inc., Ltd., Frank X., Los Angeles, Calif.
Heremetal Co., Minneapolis, Minn.
Johns-Manville, New York, N. Y.
Van-Packer Corp., Chicago, Ill.
●Wallace Co., William, Metalbestos Div., Belmont, Calif.

PIPE FITTINGS

See Fittings, Pipe

PIPE, GLASS

Corning Glass Wks., Corning, N. Y.
Fischer & Porter Co., Hatboro, Pa.

PIPE HANGERS

See Hangers and Supports, Pipe

PIPE, HARD RUBBER

American Hard Rubber Co., New York, N. Y.
Goodrich Co., B. F., Akron, O.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
Raybestos-Manhattan, Inc., Passaic, N. J.
Stokes Molded Products, Inc., Trenton, N. J.
United States Rubber Co., New York, N. Y.

PIPE INSULATION ADHESIVES

See Adhesives, for Pipe Covering

PIPE, JACKETED

Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Flori Pipe Co., The, St. Louis, Mo.
Fluid Systems, Inc., New Haven, Conn.
Kaiser Co., E. B., Chicago, Ill.
●Midwest Piping & Supply Co., Inc., St. Louis, Mo.
Nooter Corp., St. Louis, Mo.
Parks-Cramer Co., Fitchburg, Mass.
Pittsburgh Pipe Coil & Bending Co., Etna, Pa.
●Ric-wiL Co., Cleveland, O.
Roessing Mfg. Co., Pittsburgh, Pa.
Shaw-Kendall Engineering Co., Toledo, O.

PIPE JOINT COMPOUNDS

See Cement and Compounds, Pipe Joint

PIPE LOCATORS

See Locators, Pipe, Underground

PIPE, LINED

American Brass Co., Waterbury, Conn. (Tin)
American Cast Iron Pipe Co., Birmingham, Ala. (Cement)
American Hard Rubber Co., New York, N. Y. (Rubber)
Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
Cement Lined Pipe Co., Lynn, Mass. (Cement)
Clow & Sons, James B., Chicago, Ill.
Division Lead Co., Chicago, Ill.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Gates Engineering Co., Wilmington, Del.
Goodrich Co., B. F., Akron, O. (Rubber-lined)
Heresite & Chemical Co., Manitowoc, Wis.
Jones & Laughlin Steel Corp., Pittsburgh, Pa. (Cement)
Kaiser Co., E. B., Chicago, Ill.
Knight, Maurice A., Akron, O.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead and tin lined)
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
Michigan Pipe Co., Bay City, Mich. (Wood, saran rubber)
National Lead Co., New York, N. Y. (Lead)
Nooter Corp., St. Louis, Mo.
Raybestos-Manhattan, Inc., Passaic, N. J. (Rubber)
Resisto Pipe & Valve Co., East Cambridge, Mass. (Lead)
United States Rubber Co., New York, N. Y. (Rubber)
United States Stoneware Co., New York, N. Y.
Warren Foundry & Pipe Corp., New York, N. Y. (Cement)
●Youngstown Sheet & Tube Co., Youngstown, O.

PIPE, NICKEL AND NICKEL ALLOY

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Electric Steel Foundry Co., Portland, Ore.
●Globe Steel Tubes Co., Milwaukee, Wis.
International Nickel Co., Inc., The, New York, N. Y.
●Revere Copper and Brass, Incorporated, New York, N. Y.
Tri-Clover Machine Co., Kenosha, Wis.

PIPE, PLASTIC

Acadia Synthetic Products, Div., Western Felt Works, Chicago, Ill.
American Hard Rubber Co., New York, N. Y.
Commercial Plastics Co., Chicago, Ill.
Continental-Diamond Fibre Co., Newark, Del.
Extruded Plastics, Inc., Norwalk, Conn.
Haveg Corp., Newark, Del.
Mills Corp., Elmer E., Chicago, Ill.
North Penn Co., New York, N. Y.
Panelyte Div., St. Regis Paper Co., New York, N. Y.
United States Rubber Co., New York, N. Y.
United States Stoneware Co., New York, N. Y.
Yardley Plastics Co., Columbus, O.

PIPE, PRE-INSULATED

●Durant Insulated Pipe Co., Palo Alto, Calif.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Flexible Tubing Corp., Branford, Conn.
Kaiser Co., E. B., Chicago, Ill.
●Ric-wiL Co., Cleveland, O.

PIPE REAMERS

See Reamers, Pipe

PIPE REPAIR CLAMPS

See Clamps, Pipe Repair

PIPE, SPIRAL, RIVETED AND WELDED

Armco Drainage & Metal Products, Inc., Middletown, O.
Biggs Boiler Wks., Co., The, E. Akron, O.
Naylor Pipe Co., Chicago, Ill.
Nikoh Tube Co., Chicago, Ill.
●Taylor Forge & Pipe Wks., Chicago, Ill.

PIPE, STEEL, ALLOY

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
●Globe Steel Tubes Co., Milwaukee, Wis.
National Tube Co., United States Steel Corp., Sub., Pittsburgh, Pa.
●Youngstown Sheet & Tube Co., Youngstown, O.

PIPE, STEEL, BUTT AND LAP WELDED

●Bethlehem Steel Co., Bethlehem, Pa.
Byers Co., A. M., Pittsburgh, Pa.
Chicago Metal Mfg. Co., Chicago, Ill.
Electric Steel Foundry Co., Portland, Ore.
Fretz-Moon Tube Co., Butler, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Laclede Steel Co., St. Louis, Mo.
National Tube Co., United States Steel Corp., Sub., Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, O.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y. (Specially fabricated)
Smith Corp., A. O., Milwaukee, Wis.
South Chester Tube Co., Chester, Pa.
●Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Tippett & Wood, Phillipsburgh, N. J. (12 in. and larger)
●Wheatland Tube Co., Philadelphia, Pa.
Wheeling Steel Corp., Wheeling, W. Va.
●Youngstown Sheet & Tube Co., Youngstown, O.

PIPE, STEEL, SEAMLESS

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
●Globe Steel Tubes Co., Milwaukee, Wis.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
National Tube Co., United States Steel Corp., Sub., Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
●Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Timken Roller Bearing Co., Canton, O.
●Youngstown Sheet & Tube Co., Youngstown, O.

PIPE, STEEL, STAINLESS

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
●Globe Steel Tubes Co., Milwaukee, Wis.
Michigan Pipe Co., Bay City, Mich.
National Tube Co., United States Steel Corp., Sub., Pittsburgh, Pa.
Republic Steel Corp., Steel and Tubes Div., Cleveland, O.
Timken Roller Bearing Co., Canton, O.

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Trent Tube Co., East Troy, Wis.
Tri-Clover Machine Co., Kenosha, Wis.

PIPE, STONEWARE

General Ceramics & Steatite Corp., Keasbey, N. J.
Knight, Maurice A., Akron, O.
United States Stoneware Co., New York, N. Y.

PIPE SUPPORTS

See Hangers and Supports, Pipe

PIPE, TIN

Alpha Metals, Inc., Brooklyn, N. Y.
Division Lead Co., Chicago, Ill.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
National Lead Co., New York, N. Y.
Standard Rolling Mills, Inc., Brooklyn, N. Y.

PIPE TONGS

See Tongs, Pipe

PIPE, TUBING, FITTINGS AND VALVES, CARBON AND GRAPHITE

General Ceramics & Steatite Corp., Keasbey, N. J.
National Carbon Co., New York, N. Y.

PIPE AND TUBING, LEAD AND LEAD ALLOY

Alpha Metals, Inc., Brooklyn, N. Y.
Division Lead Co., Chicago, Ill.
Eagle-Picher Co., Cincinnati, O.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Flemm Lead Co., Inc., Long Island City, N. Y.
Gardiner Metal Co., Chicago, Ill.
Lissberger & Son, Inc., Marks, Long Island City, N. Y.
National Lead Co., New York, N. Y.
Northwest Lead Co., Seattle, Wash.
Rochester Lead Works, Inc., Rochester, N. Y.
Standard Rolling Mills, Inc., Brooklyn, N. Y.
United States Stoneware Co., New York, N. Y.

PIPE VISES

See Vises, Pipe

PIPE, VITRIFIED CLAY

Bowerston Shale Co., Bowerston, O.
Cannelton Sewer Pipe Co., RadianTile Div., Chicago, Ill.
●Ric-wiL Co., Cleveland, O.
Robinson Clay Product Co., The, Akron, O.
Stillwater Clay Products Co., The, Cleveland, O.

PIPE, WOOD

●American District Steam Co., North Tonawanda, N. Y.
Caldwell Co., W. E., Louisville, Ky.
Michigan Pipe Co., Bay City, Mich.
Santa Fe Tank & Tower Co., Los Angeles, Calif.

PIPE WRENCHES

See Wrenches, Pipe

PIPE, WROUGHT IRON

Byers Co., A. M., Pittsburgh, Pa.

PIPING IDENTIFICATON MARKERS

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PISTON RINGS

See Rings, Piston

PITOT TUBES

See Tubes, Pitot

PITTSBURGH LOCK FORMING MACHINES

See Machines, Pittsburgh Lock Forming

PLASTIC PIPE AND PIPE FITTINGS

See Pipe, Plastic; Fittings, Pipe, Plastic

PLASTIC TUBING

See Tubing, Plastic

PLATES, FLOOR AND CEILING

Beaton & Cadwell Mfg. Co., New Britain, Conn.
Beaton & Corbin Mfg. Co., Southington, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Specialty Mfg. Co., Chicago, Ill.
Farley Sleeve & Hanger Co., Cleveland, O.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
G & H Mfg. Co., Philadelphia, Pa.
●Grinnell Co., Providence, R. I.
Hupp Corp., Globe Stamping Div., Cleveland, O.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keeney Mfg. Co., Newington, Conn.
Little Mfg. Co., M. S., Hartford, Conn.
Ritter Pattern & Casting Co., Inc., New York, N. Y.
Russell Mfg. Co., John M., Naugatuck, Conn.
●Walworth Co., New York, N. Y.

PLUG COCKS

See Valves, Plug

PLUG VALVES

See Valves, Plug

PLUGS, FUSIBLE, BOILER

Chicago Specialty Mfg. Co., Chicago, Ill.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Swift Lubricator Co., Elmira, N. Y.
●Walworth Co., New York, N. Y.

PLUGS, REPAIR, FOR TANKS

Chicago Specialty Mfg. Co., Chicago, Ill.
Kenney Co., L. C., Chicago, Ill.
Standard Pressed Steel Co., Jenkintown, Pa.
U. S. Plug & Fitting Co., Cleveland, O.

POROUS METAL

See Metal, Porous

PORTS, OBSERVATION, BOILER

Bigelow Liptak Corp., Detroit, Mich.
Chicago Fire Brick Co., Chicago, Ill.
●Detroit Stoker Co., Detroit, Mich.
Green Fire Brick Co., Mexico, Mo.
National Airoil Burner Co., Inc., Philadelphia, Pa.
Plibrico Jointless Firebrick Co., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
Ramtite Co., The, Chicago, Ill.
Springfield Boiler Co., Springfield, Ill.

POSITIONERS, WELDING

See Welding and Cutting Apparatus, Oxy-Acetylene

POWER SHEARS

See Shears, Power

PREHEATERS, FUEL OIL

●American District Steam Co., North Tonawanda, N. Y.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
Brown Fintube Co., The, Elyria, O.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Cooper Co., Clark, Palmyra, N. J.
Crotty Mfg. Co., Flushing, L. I., N. Y.
●Davis Engineering Corp., Elizabeth, N. J.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Downingtown Iron Works, Downingtown, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Drying Systems, Inc., Chicago, Ill.
Engineer Co., New York, N. Y.
Falcon Equipment Co., New Brighton, Pa.
Fluid Systems, Inc., New Haven, Conn.
General Fittings Co., Providence, R. I.
General Heaters & Regulators Co., Chicago, Ill.
Griscom-Russell Co., New York, N. Y.
Heat Transfer Products, Inc., Carbondale, Pa.
Industrial Engineering & Equipment Co., St. Louis, Mo. (Electric)
Johnson Corp., The, Three Rivers, Mich.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
Martin-Quaid Co., Philadelphia, Pa.
National Airoil Burner Co., Inc., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Peabody Engineering Corp., New York, N. Y.
Preferred Utilities Mfg. Corp., New York, N. Y.
Reliable Products Mfg. Co., Brooklyn, N. Y.
●Rempe Co., Chicago, Ill.
Richmond Engineering Co., Inc., Richmond, Va.

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Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
Sims Co., Erie, Pa.
Standard Heater & Oil Equipment Co., Jersey City, N. J.
Staples & Pfeiffer, San Francisco, Calif.
●Struthers Wells Corp., Titusville, Pa.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
Todd Shipyards Corp., Combustion Equipment Div., Elmhurst, L. I. N. Y.
Trent Inc., Philadelphia, Pa.
Vulcan Electric Co., Danvers, Mass.
Whitlock Mfg. Co., Hartford, Conn.
●Wiegand Co., Edwin L., Pittsburgh, Pa. (Electric)
Yula Water Heaters Inc., New York, N. Y.

PREHEATERS AND STRESS RELIEVERS, ELECTRIC, FOR PIPE WELDS

Electric Arc, Inc., Newark, N. J.
Falcon Equipment Co., New Brighton, Pa.
Martin-Quaid Co., Philadelphia, Pa.
Trent Inc., Philadelphia, Pa.
●Wiegand Co., Edwin L., Pittsburgh, Pa.

PRE-INSULATED PIPE

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PRESSURE BLOWERS

See Blowers, High Pressure

PRESSURE CONTROLLERS

See Regulators, Pressure

PRESSURE GAGES

See Gages, Indicating, Pressure

PRESSURE INDICATOR-CONTROLLERS

See Indicator-Controllers, Pressure

PRESSURE RECORDER-CONTROLLERS

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PRESSURE RECORDERS

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PRESSURE REDUCING VALVES

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PRESSURE REGULATING VALVES

See Valves, Pressure Reducing and Regulating

PRESSURE REGULATORS

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PRESSURE SWITCHES

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PROCESS HEATING SYSTEMS

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PROCESS STEAM SUPERHEATERS

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PROCESS AND STORAGE TANKS

See Tanks, Process and Storage

PROPELLER FANS

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PROPELLER PUMPS

See Pumps, Propeller

PROPORTIONING PUMPS

See Pumps, Proportioning

PROTECTIVE COATINGS

See Coatings, Protective, for Metal

PROTECTORS, GAGE GLASS

Wright-Austin Co., Detroit, Mich.

PROTECTORS, PIPE COVERING

●American District Steam Co., North Tonawanda, N. Y.
Bigelow-Liptak Corp., Detroit, Mich.
Carpenter & Paterson, Inc., East Boston, Mass.
Childers Mfg. Co., Houston, Tex.
Cinder Products Corp., Providence, R. I.
●Grant Wilson Inc., Chicago, Ill.
●Grinnell Co., Inc., Providence, R. I.
●Ric-wiL Co., Cleveland, O.

PSYCHROMETERS, MOTOR ASPIRATED

Bristol Co., The, Waterbury, Conn.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Hill, E. Vernon & Co., Chicago, Ill.
Illinois Testing Laboratories, Inc., Chicago, Ill.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.

PSYCHROMETERS, SLING AND HAND ASPIRATED

American Moistening Co., Providence, R. I.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
G. M. Mfg. Co., New York, N. Y.
General Scientific Equipment Co., Philadelphia, Pa.
●Grinnell Co., Inc., Providence, R. I.
H-B Instrument Co., Philadelphia, Pa.
Hill, E. Vernon & Co., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
Moeller Instrument Co., Richmond Hill, N. Y.
Palmer Thermometers, Inc., Cincinnati (Norwood), O.
Parks-Cramer Co., Fitchburg, Mass.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Scientific Instrument Co., Detroit, Mich.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Weksler Thermometer Corp., New York, N. Y.
Weston Electrical Instrument Corp., Newark, N. J.

PSYCHROSTATS

See Humidistats

PULLEYS AND SHEAVES, FOR BELT DRIVES

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulley Co., Philadelphia, Pa.
Browning Mfg. Co., Inc., Maysville, Ky.
Central Die Casting & Mfg. Co., Inc., Chicago, Ill. (V belt)
Chicago Die Casting Mfg. Co., Chicago, Ill. (v-type and flat type)
Congress Drives Div., Tann Corp., Detroit, Mich. (V belt—fractional and multiple horsepower)
Dayton Rubber Co., Dayton, O.
Dick Co., Inc., R. & J., Passaic, N. J. (Steel split)
Doall Co., The, Des Plaines, Ill.
●Dodge Mfg. Corp., Mishawaka, Ind.
Gates Rubber Co., The, Denver, Colo.
Goldens' Foundry & Machine Co., Columbus, Ga. (Cast iron)
Horton Mfg. Co., Minneapolis, Minn. (Variable speed)
Jones Foundry Machine Co., W. A., Chicago, Ill. (flat)
Lau Blower Co., Dayton, O.
Lewellen Mfg. Co., Columbus, Ind.
Lovejoy Flexible Coupling Co., Chicago, Ill.
Maurey Mfg. Corp., Chicago, Ill. (v-belt steel and cast iron)
Medart Co., St. Louis, Mo.
Pyott Foundry & Machine Co., Chicago, Ill.
Rockwood Mfg. Co., Inc., Indianapolis, Ind.
●Schnacke, Inc., Evansville, Ind. (v-type)
Scientiae Tool Co., Dayton, O. (variable pitch)
Speed Selector Inc., Cleveland, O. (variable pitch)
Sprout-Waldron & Co., Muncy, Pa.
Swift Mfg. Co., Inc., Hazel Park, Mich. (Cast iron)
Thermoid Co., Trenton, N. J.
Utility Appliance Corp., Los Angeles, Calif.
V-Belt Clutch Co., Los Angeles, Calif.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Webster Electric Co., Racine, Wis.
Wood's Sons Co., T. B., Chambersburg, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J. (v-type)

PULVERIZED COAL BURNERS

See Burners, Pulverized Coal

PUMP BASES

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PUMP UNITS, FUEL OIL

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PUMP VALVES

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PUMPS, BOILER FEED

Aldrich Pump Co., Allentown, Pa.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
●Aurora Pump Co., Aurora, Ill.
●Buffalo Pumps, Inc., Buffalo, N. Y.
●Chicago Pump Co., Chicago, Ill.
Cissell Mfg. Co., Inc., W. M., Louisville, Ky.

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Coffin Co., J. S., Jr., Englewood, N. J.
Columbus Steam Pump Wks., Co., Columbus, O.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Cyclotherm Corp., Oswego, N. Y.
Davidson Co., M. T., Brooklyn, N. Y.
Dean Brothers Pumps, Inc., Indianapolis, Ind.
Dean Hill Pump Co., Indianapolis, Ind.
Decatur Pump Co., Decatur, Ill.
DeLaval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
Domestic Engine & Pump Co., Shippensburg, Pa.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
●Eclipse Fuel Engineering Co., Rockford, Ill.
●Economy Pumps, Inc., Hamilton, O.
Everite Pump & Mfg. Co., Inc., Lancaster, Pa.
Faber Engineering Co., Inc., Philadelphia, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Frederick Iron & Steel Inc., Frederick, Md.
Gardner-Denver Co., Quincy, Ill.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Ingersoll-Rand Co., New York, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Johnson Corp., The, Three Rivers, Mich.
Kingsford Foundry & Machine Wks., Oswego, N. Y.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Lawrence Pump & Engine Co., Lawrence, Mass.
Lecourtenay Co., Newark, N. J.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
●McDonnell & Miller, Inc., Chicago, Ill.
Mears-Kane-Ofeldt, Inc., Bridgeport, Pa.
Morris Machine Works, Baldwinsville, N. Y.
●Nash Engineering Co., South Norwalk, Conn.
National Steam Pump Co., Upper Sandusky, O.
Oberdorfer Foundries, Inc., Syracuse, N. Y.
Pacific Pumping Co., Oakland, Calif.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
Robbins & Myers, Inc., Springfield, O.
Roth Co., Roy E., Rock Island, Ill.
Schaub Engineering Co., Fred H., Chicago, Ill.
●Skidmore Corp., St. Joseph, Mich.
Sta-Rite Products, Inc., Delavan, Wis.
●Sterling, Inc., Milwaukee, Wis.
Stout & Sons, David, St. Louis, Mo.
Swaby Mfg. Co., Chicago, Ill.
Union Steam Pump Co., Battle Creek, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.
●Weil Pump Co., Chicago, Ill.
●Weinman Pump Mfg. Co., The, Columbus, O.
●Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Whittington Pump & Engineering Corp., Indianapolis, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, CENTRIFUGAL

Alliance Industries, Huntingden Valley, Pa.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
American Well Wks., Aurora, Ill.
●Aurora Pump Co., Aurora, Ill.
Barnes Manufacturing Co., Mansfield, O.
Barrett, Haentjens & Co., Hazleton, Pa.
Beach-Russ Co., New York, N. Y.
Beckett & Co., Inc., Thomas, Dallas, Tex.
●Bell & Gossett Co., Morton Grove, Ill.
Blaisdell Compressor Co., New York, N. Y.
●Buffalo Pumps, Inc., Buffalo, N. Y.
Bump Pump Co., LaCrosse, Wis.
Carver Pump Co., Muscatine, Ia.
Chain Belt Co., Milwaukee, Wis.
●Chicago Pump Co., Chicago, Ill.
Columbus Steam Pump Wks. Co., Columbus, O.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davidson Co., M. T., Brooklyn, N. Y.
Dean Brothers Pumps, Inc., Indianapolis, Ind.
Dean Hill Pump Co., Indianapolis, Ind.
Decatur Pump Co., Decatur, Ill.
DeLaval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
Domestic Engine & Pump Co., Shippensburg, Pa.
●Dunham Co., C. A., Chicago, Ill.
Duriron Co., Inc., Dayton, O. (Acid resisting)
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Eastern Industries Inc., New Haven, Conn.
●Economy Pumps, Inc., Hamilton, O.
Fairbanks, Morse & Co., Chicago, Ill.
Foster Pump Works, Inc., Brooklyn, N. Y.
Frederick Iron & Steel Inc., Frederick, Md.
Fulflo Specialties Co., Inc., The, Blanchester, O.
Gardner-Denver Co., Quincy, Ill.
General Ceramics & Steatite Corp., Keasbey, N. J. (Chemical stoneware)
Gorman-Rupp Co., Mansfield, O.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
Hypro Engineering Co., Minneapolis, Minn.
●Ingersoll-Rand Co., New York, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Kingsford Foundry & Machine Wks., Oswego, N. Y.
La Bour Co., Inc., The, Elkhart, Ind.
Lawrence Pump & Engine Co., Lawrence, Mass.
Lead Lined Iron Pipe Co., Wakefield, Mass. (lead lined and all lead)
Lecourtenay Co., Newark, N. J.
Lewis & Co., Inc., Chas. S., St. Louis, Mo.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
●Little Giant Vaporizer Co., Inc., Oklahoma City, Okla.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
Marlow Pumps, Ridgewood, N. J.
Morey, Dan, Los Angeles, Calif.
Morris Machine Works, Baldwinsville, N. Y.
Myers & Bro. Co., F. E., The, Ashland, O.
National Carbon Co., New York, N. Y.
Oberdorfer Foundries, Inc., Syracuse, N. Y.
Pacific Pumping Co., Oakland, Calif.
Palmer Electric Co., Detroit, Mich.
Peerless of America, Inc., Chicago, Ill.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Pioneer Pump & Mfg. Co., Detroit, Mich.
Red Jacket Mfg. Co., Davenport, Ia.
Schneible Co., Claude B., Detroit, Mich.
Schwitzer-Cummins Co., Indianapolis, Ind.
●Skidmore Corp., St. Joseph, Mich.
Smith Corp., A. O., Milwaukee, Wis.
Standard Electric Mfg. Co., West Berlin, N. J.
Sta-Rite Products, Inc., Delavan, Wis.
●Sterling, Inc., Milwaukee, Wis.
Sumo Pumps, Inc., Stamford, Conn. (for submerged operation)
Swaby Mfg. Co., Chicago, Ill.
Taber Pump Co., Buffalo, N. Y.
●Trane Co., The, LaCrosse, Wis.
Tri-Clover Machine Co., Kenosha, Wis.
Union Steam Pump Co., Battle Creek, Mich.
Utility Appliance Corp., Los Angeles, Calif.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Warren Steam Pump Co., Inc., Warren, Mass.
●Weil Pump Co., Chicago, Ill.
●Weinman Pump Mfg. Co., The, Columbus, O.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, CONDENSATION RETURN

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Hydrovac, Inc., Brooklyn, N. Y.
American Marsh Pumps, Inc., Battle Creek, Mich.
●Aurora Pump Co., Aurora, Ill.
●Buffalo Pumps, Inc., Buffalo, N. Y.
●Chicago Pump Co., Chicago, Ill.
Cissell Mfg. Co., Inc., W. M., Louisville, Ky.
Cochrane Corp., Philadelphia, Pa.
Coffin Co., J. S., Jr., Englewood, N. J.
Columbus Steam Pump Wks. Co., Columbus, O.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davidson Co., M. T., Brooklyn, N. Y.
●Dean Brothers Pumps, Inc., Indianapolis, Ind.
Dean Hill Pump Co., Indianapolis, Ind.
Decatur Pump Co., Decatur, Ill.
De Laval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
Domestic Engine & Pump Co., Shippensburg, Pa.
●Dunham Co., C. A., Chicago, Ill.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Eastern Industries, Inc., New Haven, Conn.
●Eclipse Fuel Engineering Co., Rockford, Ill.
●Economy Pumps, Inc., Hamilton, O.
Everite Pump & Mfg. Co., Inc., Lancaster, Pa.
Faber Engineering Co., Inc., Philadelphia, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Frederick Iron & Steel Inc., Frederick, Md.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
Heating Assurance, Inc., Spokane, Wash.
●Hoffman Specialty Co., Indianapolis, Ind.
●Ingersoll-Rand Co., New York, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Johnson Corp., The, Three Rivers, Mich.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Lawrence Pump & Engine Co., Lawrence, Mass.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
Mears-Kane-Ofeldt, Inc., Bridgeport, Pa.
Myers & Bro. Co., F. E., The, Ashland, O.
●Nash Engineering Co., South Norwalk, Conn.
Oberdorfer Foundries, Inc., Syracuse, N. Y.
Pacific Pumping Co., Oakland, Calif.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Roth Co., Roy E., Rock Island, Ill.
Schaub Engineering Co., Fred H., Chicago, Ill.

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●Sellers Engineering Co., Chicago, Ill.
●Skidmore Corp., St. Joseph, Mo.
Sta-Rite Products, Inc., Delavan, Wis.
●Sterling, Inc., Milwaukee, Wis.
Stout & Sons, David, St. Louis, Mo.
Swaby Mfg. Co., Chicago, Ill.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Trane Co., The, LaCrosse, Wis.
Union Steam Pump Co., Battle Creek, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.
●Weil Pump Co., Chicago, Ill.
●Weinman Pump Mfg. Co., The, Columbus, O.
●Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Whittington Pump & Engineering Corp., Indianapolis, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, DEEP WELL, TURBINE

American-Marsh Pumps, Inc., Battle Creek, Mich.
American Well Wks., Aurora, Ill.
●Aurora Pump Co., Aurora, Ill.
Cook, Inc., A. D. Lawrenceburg, Ind.
Davidson Co., M. T., Brooklyn, N. Y.
Decatur Pump Co, Decatur, Ill. (shallow well)
Deming Co., Salem, O.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Guild & Garrison, Inc., Brooklyn, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Layne & Bowler, Inc., Memphis, Tenn.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
Pacific Pumping Co., Oakland, Calif.
Peerless Pump Div, Food Machinery & Chemical Corp., Los Angeles, Calif.
Red Jacket Mfg. Co., Davenport, Ia.
Smith Corp., A. O., Milwaukee, Wis.
Sta-Rite Products, Inc., Delavan, Wis.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, FIRE

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
●Aurora Pump Co., Auroro, Ill.
Barnes Manufacturing Co., Mansfield, O.
●Buffalo Pumps, Inc., Buffalo, N. Y.
●Chicago Pump Co., Chicago, Ill.
Cook, Inc., Lawrenceburg, Ind.
Davidson Co., M. T., Brooklyn, N. Y.
De Laval Steam Turbine Co., Trenton, N. J.
●Economy Pumps, Inc., Hamilton, O.
Fairbanks, Morse & Co., Chicago, Ill.
Frederick Iron & Steel Inc., Frederick, Md.
Gorman-Rupp Co., Mansfield, O.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Ingersoll-Rand Co., New York, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Layne & Bowler, Inc., Memphis, Tenn.
Lecourtenay Co., Newark, N. J.
Leyman Mfg. Corp., John H. McGowan Co. Div., Cincinnati, O.
Marlow Pumps, Ridgewood, N. J.
Morris Machine Wks., Baldwinsville, N. Y.
Myers & Bro. Co., F. E., The, Ashland, O.
Oberdorfer Foundries, Inc., Syracuse, N. Y.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Viking Pump Co., Cedar Falls, Ia.
Warres Steam Pump Co., Inc., Warren, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, HIGH PRESSURE, HYDRAULIC

Aldrich Pump Co., Allentown, Pa.
American Engineering Co., Philadelphia, Pa.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Blackhawk Mfg. Co., Milwaukee, Wis.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Daigger & Co., A., Chicago, Ill.
Davidson Co., M. T., Brooklyn, N. Y.
De Laval Steam Turbine Co., Trenton, N. J.
Dudgeon, Inc, Richard, Brooklyn, N. Y.
Gorman-Rupp Co., Mansfield, O.
Guild & Garrison, Inc., Brooklyn, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Milton Roy Co., Philadelphia, Pa.
National Steam Pump Co., Upper Sandusky, O.
Robbins & Myers, Inc., Springfield, O.
Roper Corp., Geo. D., Rockford, Ill.
Sta-Rite Products, Inc., Delavan, Wis.
●Struthers Wells Corp., Titusville, Pa.
Union Steam Pump Co., Battle Creek, Mich.
Viking Pump Co., Cedar Falls, Ia.
Watson-Stillman Co., Roselle, N. J.

PUMPS, LIQUID REFRIGERANT CIRCULATING

Alliance Industries, Huntingden Valley, Pa.
American-Marsh Pumps, Inc., Battle Creek, Mich.
●Aurora Pump Co., Aurora, Ill.
●Chicago Pump Co., Chicago, Ill.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Davidson Co., M. T., Brooklyn, N. J.
De Laval Steam Turbine Co., Trenton, N. J.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
●Economy Pumps, Inc., Hamilton, O.
Fairbanks, Morse & Co., Chicago, Ill.
●Frick Co., Waynesboro, Pa.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Ingersoll-Rand Co., New York, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Lewis & Co., Chas. S., St. Louis, Mo.
Marlow Pumps, Ridgewood, N. J.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Pioneer Pump & Mfg. Co., Detroit, Mich.
Roper Corp., Geo. D., Rockford, Ill.
Roth Co., Roy E., Rock Island, Ill.
Viking Pump Co., Cedar Falls, Ia.
Vilter Mfg. Co., Milwaukee, Wis.
Warren Steam Pump Co., Inc., Warren, Mass.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, PROPELLER

American Well Works, Aurora, Ill.
●Economy Pumps, Inc., Hamilton, O.
Frederick Iron & Steel Inc., Frederick, Md.
Haertel Co., Walter, Minneapolis, Minn.
●Ingersoll-Rand Co., New York, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Morris Machine Wks., Baldwinsville, N. Y.
Pacific Pumping Co., Oakland, Calif.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Pioneer Pump & Mfg. Co., Detroit, Mich.
Tri-Clover Machine Co., Kenosha, Wis.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, PROPORTIONING

Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Cochrane Corp., Philadelphia, Pa.
Dearborn Chemical Co., Chicago, Ill.
Duriron Co., Inc., The, Dayton, O.
Jacuzzi Bros., Inc., Richmond, Calif.
Madden & Co., P. E., Chicago, Ill.
Marco Co., Inc., Wilmington, Del.
Milton Roy Co., Philadelphia, Pa.
Nelson Chemical Pumps, Casper, Wyo.
% Proportioneers, Inc., %, Providence, R. I.
Robbins & Myers, Inc., Springfield, O.
Wallace & Tiernan Co., Inc., Newark, N. J.

PUMPS, RECIPROCATING

Aldrich Pump Co., Allentown, Pa.
Altens Foundry & Machine Works, Inc., Lancaster, O.
American Hard Rubber Co., New York, N. Y. (Rubber and Rubber lined)
American-Marsh Pumps, Inc., Battle Creek, Mich
Columbus Steam Pump Wks., Columbus, O.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Cook, Inc., A. D., Lawrenceburg, Ind.
Davidson Co., M. T., Brooklyn, N. Y.
Dean Brothers Pumps, Inc., Indianapolis, Ind.
Delco Appliance Div., General Motors Corp., Rochester, N. Y.
Deming Co., Salem, O.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc, Pittsburgh, Pa.
Duriron Co., Inc., The, Dayton, O. (acid resisting)
Duro Co., Dayton, O.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Everite Pump & Mfg. Co., Inc., Lancaster, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Gardner-Denver Co., Quincy, Ill.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
Hills-McCanna Co., Chicago, Ill.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Ingersoll-Rand Co., New York, N. Y.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
Marlow Pumps, Ridgewood, N. J.
Milton Roy Co., Philadelphia, Pa.
Myers & Bro. Co., F. E., The, Ashland, O.
National Steam Pump Co., Upper Sandusky, O.
National Water Lift Inc., Kalamazoo, Mich.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Red Jacket Mfg. Co., Davenport, Ia.
Ross Valve Mfg. Co., Inc., Troy, N. Y.
Sta-Rite Products, Inc., Delavan, Wis.
Uniflow Mfg. Co., Erie, Pa.

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Union Steam Pump Co., Battle Creek, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.
Watson-Stillman Co., Roselle, N. J.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, ROTARY

Altens Foundry & Machine Works, Inc., Lancaster, O.
American Engineering Co., Philadelphia, Pa.
American Hard Rubber Co., New York, N. Y. (Rubber and rubber lined)
Beach-Russ Co., New York, N. Y.
Blackmer Pump Co., Grand Rapids, Mich.
Bowser, Inc., Fort Wayne, Ind.
Bump Pump Co., La Crosse, Wis.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
De Laval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
Duriron Co., Inc., The, Dayton, O. (Acid resisting)
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Eastern Industries, Inc., New Haven, Conn.
Fairbanks, Morse & Co., Chicago, Ill.
Foster Pump Wks., Inc., Brooklyn, N. Y.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Hypro Engineering Co., Minneapolis, Minn.
Jabsco Pump Co., Burbank, Calif.
Kinney Mfg. Co., Boston, Mass.
Kraissl Co., Inc., The, Hackensack, N. J.
Lammert & Mann Co., Chicago, Ill.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
Marco Co., Inc, Wilmington, Del.
Martocello & Co., Jos. A., Philadelphia, Pa.
May Oil Burner Div., Gerotor May Corp., Baltimore, Md.
●Nash Engineering Co., South Norwalk, Conn.
Oberdorfer Foundries, Inc., Syracuse, N. Y.
Pioneer Pump & Mfg. Co., Detroit, Mich.
Polo Pump Co., Polo, Ill.
Red Jacket Mfg. Co., Davenport, Ia.
Robbins & Myers, Inc., Springfield, O.
Roots-Connersville Blower Corp., Connersville, Ind.
Roper Corp., Geo. D., Rockford, Ill.
Roth Co., Roy E., Rock Island, Ill.
St. Louis Tool Co., St. Louis, Mo.
Schutte & Koerting Co., Philadelphia, Pa.
Scott-Newcomb, Inc., St. Louis, Mo.
Sundstrand Machine Tool Co., Hydraulic Div., Rockford, Ill. (for oil burners)
Taber Pump Co., Buffalo, N. Y.
Trimount Rotary Power Co., Dedham, Mass.
Tuthill Pump Co., Chicago, Ill.
Vanton Pump Corp., New York, N. Y.
Viking Pump Co., Cedar Falls, Ia.
Webster Electric Co., Racine, Wis.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yale & Towne Mfg. Co., Stamford, Conn.

PUMPS, SEWAGE AND SLUDGE

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
American Well Works, Aurora, Ill.
●Aurora Pump Co., Aurora, Ill.
Barnes Manufacturing Co., Mansfield, O.
●Buffalo Pumps, Inc., Buffalo, N. Y.
●Chicago Pump Co., Chicago, Ill.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
De Laval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
Domestic Engine & Pump Co., Shippensburg, Pa.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
●Economy Pumps, Inc., Hamilton, O.
Frederick Iron & Steel Inc., Frederick, Md.
Gardner-Denver Co., Quincy, Ill.
Gorman-Rupp Co., Mansfield, O.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Ingersoll-Rand Co., New York, N. Y.
Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Kingsford Foundry & Machine Works, Oswego, N. Y.
Marlow Pumps, Ridgewood, N. J.
●Nash Engineering Co., South Norwalk, Conn.
Pacific Pumping Co., Oakland, Calif.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Robbins & Myers, Inc., Springfield, O.
Swaby Mfg. Co., Chicago, Ill.
●Weil Pump Co., Chicago, Ill.
●Weinman Pump Mfg. Co., The, Columbus, O.
Whittington Pump & Engineering Corp., Indianapolis, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, STEAM

American-Marsh Pumps, Inc., Battle Creek, Mich.
Columbus Steam Pump Wks., Co., Columbus, O.
Davidson Co., M. T., Brooklyn, N. Y.
Dean Brothers Pumps, Inc., Indianapolis, Ind.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Gardner-Denver Co., Quincy, Ill.
Guild & Garrison, Inc., Brooklyn, N. Y.
Jacuzzi Bros., Inc., Richmond, Calif.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
National Steam Pump Co., Upper Sandusky, O.
Union Steam Pump Co., Battle Creek, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.
Watson-Stillman Co., Roselle, N. J.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, SUMP

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
●Aurora Pump Co., Aurora, Ill.
Barnes Mfg. Co., Mansfield, O.
Barrett, Haentjens & Co., Hazleton, Pa.
●Buffalo Pumps, Inc., Buffalo, N. Y.
Chicago Pneumatic Tool Co., New York, N. Y.
●Chicago Pump Co., Chicago, Ill.
Columbus Steam Pump Wks. Co., Columbus, O.
Cook, Inc., A. D., Lawrenceburg, Ind.
Davidson Co., M. T., Brooklyn, N Y.
Dean Hill Pump Co., Indianapolis, Ind.
De Laval Steam Turbine Co., Trenton, N. J.
Deming Co., Salem, O.
Domestic Engine & Pump Co., Shippensburg, Pa.
Duro Co., Dayton, O.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
Eastern Industries, Inc., New Haven, Conn.
●Economy Pumps, Inc., Hamilton, O.
Everite Pump & Mfg. Co., Inc., Lancaster, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Frederick Iron & Steel Inc., Frederick, Md.
Friermood Machine Works, Converse, Ind.
Gorman-Rupp Co., Mansfield, O.
Goulds Pump, Inc., Seneca Falls, N. Y.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Hoffman Specialty Co., Indianapolis, Ind.
Imperial Brass Mfg. Co., Chicago, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
●Ingersoll-Rand Co., New York, N. Y.
Jabsco Pump Co., Burbank, Calif.
Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Kingsford Foundry & Machine Wks., Oswego, N. Y.
Kol-Master Corp., Oregon, Ill.
Lawrence Pump & Engine Co., Lawrence, Mass.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
Marlow Pumps, Ridgewood, N. J.
Morris Machine Wks., Baldwinsville, N. Y.
Myers & Bro. Co., F. E., The, Ashland, O.
Noera Mfg. Co., Div., Chase Brass & Copper Co., Waterbury, Conn.
Pacific Pumping Co., Oakland, Calif.
Peerless of America, Inc., Chicago, Ill.
Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Penberthy Injector Co., Detroit, Mich.
Peters-Dalton, Inc., Detroit, Mich.
Red Jacket Mfg. Co., Davenport, Ia.
Robbins & Myers, Inc., Springfield, O.
Roth Co., Roy E., Rock Island, Ill.
Schneible Co., Claude B., Detroit, Mich.
Schutte & Koerting Co., Philadelphia, Pa.
Standard Electric Mfg. Co., West Berlin, N. J.
Sta-Rite Products, Inc., Delavan, Wis.
Swaby Mfg. Co., Chicago, Ill.
Taber Pump Co., Buffalo, N. Y.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Uniflow Mfg. Co., Erie, Pa.
Union Steam Pump Co., Battle Creek, Mich.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Wade Mfg. Co., Elgin, Ill.
Warren Steam Pump Co., Inc., Warren, Mass.
●Weil Pump Co., Chicago, Ill.
●Weinman Pump Mfg. Co., The, Columbus, O.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, VACUUM

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Aminco Refrigeration Products Co., Detroit, Mich.
Barrett, Haentjens & Co., Hazleton, Pa.
Beach-Russ Co., New York, N. Y.
Bury Compressor Co., Erie, Pa.
Chicago Pneumatic Tool Co., New York, N. Y.
●Chicago Pump Co., Chicago, Ill.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Daigger & Co., A., Chicago, Ill.
Davidson Co., M. T., Brooklyn, N. Y.
Dean Brothers Pumps, Inc., Indianapolis, Ind.
De Laval Steam Turbine Co., Trenton, N. J.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
●Dunham Co., C. A., Chicago, Ill.

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●Eagan Co., Inc., Walter H., Philadelphia, Pa.
●Economy Pumps, Inc., Hamilton, O.
Eisler Engineering Co., Inc., Newark, N. J.
Electric Sprayit Co., The, Sheboygan, Wis.
Foster Pump Wks., Inc., Brooklyn, N. Y.
Foster Wheeler Corp., New York, N. Y.
Fuller Co., Catasaqua, Pa.
Gardner-Denver Co., Quincy, Ill.
General Ceramics & Steatite Corp., Keasbey, N. J. (Chemical stoneware)
Guild & Garrison, Inc., Brooklyn, N. Y.
●Ingersoll-Rand Co., New York, N. Y.
Kinney Mfg. Co., Boston, Mass.
Kraissl Co., Inc., The, Hackensack, N. J.
Lammert & Mann Co., Chicago, Ill.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
●Nash Engineering Co., South Norwalk, Conn.
National Steam Pump Co., Upper Sandusky, O.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Pioneer Pump & Mfg. Co., Detroit, Mich.
Roots-Connersville Blower Corp., Connersville, Ind.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
●Skidmore Corp., St. Joseph, Mich.
Stokes Machine Co., F. J., Philadelphia, Pa.
Trimount Rotary Power Co., Dedham, Mass.
Viking Pump Co., Cedar Falls, Ia.
●Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Whittington Pump & Engineering Corp., Indianapolis, Ind.
Will Corp., Rochester, N. Y.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUMPS, VACUUM HEATING

American Hydrovac, Inc., Brooklyn, N. Y.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Ames, Chas. F., New York, N. Y.
Chicago Pump Co., Chicago, Ill.
Columbus Steam Pump Wks. Co., Columbus, O.
Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Domestic Engine & Pump Co., Shippensburg, Pa.
●Dunham Co., C. A., Chicago, Ill.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
●Economy Pumps, Inc., Hamilton, O.
Faber Engineering Co., Inc., Philadelphia, Pa.
Gardner-Denver Co., Quincy, Ill.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Hoffman Specialty Co., Indianapolis, Ind.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
●Nash Engineering Co., South Norwalk, Conn.
Roots-Connersville Blower Corp., Connersville, Ind.
●Skidmore Corp., St. Joseph, Mich.
●Sterling, Inc., Milwaukee, Wis.
Union Steam Pump Co., Battle Creek, Mich.
Warren Steam Pump Co., Inc., Warren, Mass.
Whittington Pump & Engineering Corp., Indianapolis, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS, VISCOUS LIQUIDS AND HEAVY MATERIALS

Aldrich Pump Co., Allentown, Pa.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American-Marsh Pumps, Inc., Battle Creek, Mich.
Beach-Russ Co., New York, N. Y.
Blackmer Pump Co., Grand Rapids, Mich.
●Buffalo Pumps, Inc., Buffalo, N. Y.
Bump Pump Co., La Crosse, Wis.
●Chicago Pump Co., Chicago, Ill.
Columbus Steam Pump Wks. Co., Columbus, O.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Davidson Co., M. T., Brooklyn, N. Y.
Dean Brothers Pumps, Inc., Indianapolis, Ind.
De Laval Steam Turbine Co., Trenton, N. J.
●Eagan Co., Inc., Walter H., Philadelphia, Pa.
●Economy Pumps, Inc., Hamilton, O.
Engineer Co., New York, N. Y.
Fairbanks, Morse & Co., Chicago, Ill.
Foster Pump Wks., Inc., Brooklyn, N. Y.
Frederick Iron & Steel Inc., Frederick, Md.
Gardner-Denver Co., Quincy, Ill.
Goulds Pumps, Inc., Seneca Falls, N. Y.
Gray Co., Inc., Minneapolis, Minn.
Guild & Garrison, Inc., Brooklyn, N. Y.
●Ingersoll-Rand Co., New York, N. Y.
Jabsco Pump Co., Burbank, Calif.
Jackson Co., Byron, Los Angeles, Calif.
Jacuzzi Bros., Inc., Richmond, Calif.
Kingsford Foundry & Machine Wks., Oswego, N. Y.
Kinney Mfg. Co., Boston, Mass.
Kraissl Co., Inc., The, Hackensack, N. J.
Lawrence Pump & Engine Co., Lawrence, Mass.
Leyman Mfg. Corp., John H. McGowan Co., Div., Cincinnati, O.
Madden & Co., P. E., Chicago, Ill.
Marco Co., Inc., Wilmington, Del.
Milton Roy Co., Philadelphia, Pa.
Morris Machine Wks., Baldwinsville, N. Y.
Peerless Pump Div., Food Machinery and Chemical Corp., Los Angeles, Calif.
Red Jacket Mfg. Co., Davenport, Ia.
Robbins & Myers, Inc., Springfield, O.
Roots-Connersville Blower Corp., Connersville, Ind.
Roper Corp., Geo. D., Rockford, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Taber Pump Co., Buffalo, N. Y.
Tuthill Pump Co., Chicago, Ill.
Union Steam Pump Co., Battle Creek, Mich.
Vanton Pump Corp., New York, N. Y.
Viking Pump Co., Cedar Falls, Ia.
Warren Steam Pump Co., Inc., Warren, Mass.
Whittington Pump & Engineering Corp., Indianapolis, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.
Yeomans Bros. Co., Chicago, Ill.

PUNCHES, SHEET METAL

Blackhawk Mfg. Co., Milwaukee, Wis.
Bliss Co., E. W., Canton, O.
Callahan Can Machine Co., Inc., Brooklyn, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Cleveland Punch & Shear Wks. Co., Cleveland, O.
Excelsior Tool & Machine Co., East St. Louis, Ill.
●Greenlee Tool Co., Div. of Greenlee Bros. & Co., Rockford, Ill.
Heartley Machine & Tool Co., Toledo, O.
Hendley & Whittemore Co., Beloit, Wis.
Henry & Wright, Div. of Hartford-Empire Co., Hartford, Conn.
Kidder Mfg. Co., Inc., J. F., Burlington, Vt.
Leslie Welding Co., Chicago, Ill.
M-M-A, Inc., Lancaster, Pa.
New Albany Machine Mfg. Co., New Albany, Ind.
Niagara Machine & Tool Wks., Buffalo, N. Y.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Parker-Kalon Corp., New York, N. Y.
Peck, Stow & Wilcox Co., Southington, Conn.
Perkins Machine Co., Warren, Mass.
Reiner & Campbell Co., Inc., Newark, N. J.
Swaine Mfg. Co., Fred J., St. Louis, Mo.
Thor Tool & Die Co., Oakland, Calif.
Webb Corp., The, Webb City, Mo.
Whitney Mfg. Co., W. A., Rockford, Ill.
Whitney Metal Tool Co., Rockford, Ill.
Weidemann Machine Co., Philadelphia, Pa.
Zeh & Hahnemann Co., Newark, N. J.

PURGERS, REFRIGERANT GAS

●Armstrong Machine Works, Three Rivers, Mich.
●Frick Co., Waynesboro, Pa.
●Mueller Brass Co., Port Huron, Mich.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa.
Vilter Mfg. Co., Milwaukee, Wis.
York Corp., York, Pa.

PUSHERS, PIPE, HYDRAULIC

Blackhawk Mfg. Co., Milwaukee, Wis.
Dudgeon, Inc., Richard, Brooklyn, N. Y.
Giant Mfg. Co., Council Bluffs, Ia.
●Greenlee Tool Co., Div. of Greenlee Bros. & Co., Rockford, Ill.

RADIANT HEATING COILS

See Coils and Panels, Radiant Heating, Prefabricated

RADIATION, BASEBOARD, FERROUS

●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
●Autorad Inc., Chicago, Ill.
Burnham Corp., Boiler Div., Irvington, N. Y.
●Crane Co., Chicago, Ill.
●Dunham Co., C. A., Chicago, Ill.
●Kritzer Radiant Coils, Inc., Chicago, Ill.
●Rempe Co., Chicago, Ill.
Rittling Corp., The, Hamburg, N. Y.
●Smith Co., Inc., H. B., The, Westfield, Mass.
Sterling Radiator Co., Inc., Westfield, Mass.
●Trane Co., The, La Crosse, Wis.
United States Radiator Corp., Detroit, Mich.
Utica Radiator Corp., Utica, N. Y.
●Vulcan Radiator Co., Hartford, Conn.
Weil-McLain Co., Michigan City, Ind.

RADIATION, BASEBOARD, NON-FERROUS

Airecon Industries, Detroit, Mich.
●Appleman Glass Works, Bergenfield, N. J. (electric glass panel)
Baseline Mfg. Corp., Minneapolis, Minn.
●Brown Products Co., New York, N. Y.
●Fedders-Quigan Corp., Buffalo, N. Y.
●G & O Mfg. Co., New Haven, Conn.
●General Automatic Products, Baltimore, Md.
Huron Boiler Co., Detroit, Mich.
●Kritzer Radiant Coils, Inc., Chicago, Ill.
Minimite Co., Chicago, Ill.

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National Radiator Co., The, Johnstown, Pa.
Radiant Baseboard Panels, Inc., New Britain, Conn.
●Rittling Corp., Hamburg, N. Y.
Tenney Engineering, Inc., Newark, N. J.
●Vulcan Radiator Co., Hartford, Conn.
●Webster & Co., Warren, Camden, N. J.

RADIANT HEAT THERMOSTATS

See Thermostats, Radiant Heat

RADIANT HEATING ELECTRICAL CONDUCTORS

See Conductors, Electrical, for Radiant Heating

RADIATION, CONVECTION TYPE, FERROUS

●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
●Autorad Inc., Chicago, Ill.
Brown Fintube Co., The, Elyria, O.
●Kritzer Radiant Coils, Inc., Chicago, Ill.
Murray Mfg. Co., D. J., Wausau, Wis.
National Radiator Co., The, Johnstown, Pa.
●Rempe Co., Chicago, Ill.
●Rittling Corp., The, Hamburg, N. Y.
Stedco Products, Wilkes-Barre, Pa.
Tenney Engineering Inc., Newark, N. J.
United States Radiator Corp., Detroit, Mich.
Weil-McLain Co., Chicago, Ill.

RADIATION, CONVECTION TYPE, NON-FERROUS

Airecon Industries, Detroit, Mich.
●Airtherm Mfg. Co., St. Louis, Mo.
American Coils Co., Newark, N. J.
●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Beacon-Morris Corp., Boston, Mass.
Brown Fintube Co., The, Elyria, O.
●Brown Products Co., Forest Hills, N. Y.
●Bush Mfg. Co., West Hartford, Conn.
●Dunham Co., C. A., Chicago, Ill.
●Fedders-Quigan Corp., Buffalo, N. Y.
●G. & O. Mfg. Co., New Haven, Conn.
Kehm Corp., The, Chicago, Ill.
●Kramer Trenton Co., Trenton, N. J.
●Kritzer Radiant Coils, Inc., Chicago, Ill.
Minimite Co., Chicago, Ill.
●Modine Mfg. Co., Racine, Wis.
National Radiator Co., The, Johnstown, Pa.
●Nesbitt Inc., John J., Philadelphia, Pa.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Republic Products Co., Philadelphia, Pa.
●Rittling Corp., The, Hamburg, N. Y.
Rome-Turney Radiator Co., Rome, N. Y.
Shaw-Perkins Mfg. Co., Pittsburgh, Pa.
Tenney Engineering Inc., Newark, N. J.
●Trane Co., The, La Crosse, Wis.
●Tuttle & Bailey, Inc., New Britain, Conn.
United States Radiator Corp., Detroit, Mich.
Universal Convector Corp., New York, N. Y.
Vapor Heating Corp., Chicago, Ill.
●Webster & Co., Warren, Camden, N. J.
●Young Radiator Co., Racine, Wis.

RADIATION, DIRECT

●American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Burnham Corp., Boiler Div., Irvington, N. Y.
Clifford Mfg. Co., Div. of Standard-Thomson Corp., Waltham, Mass. (For aircraft)
Clow & Sons, James B., Chicago, Ill. (Gas fired)
Columbia Radiator Co., McKeesport, Pa.
●Crane Co., Chicago, Ill.
Dunkirk Radiator Corp., Dunkirk, N. Y.
Murray Mfg. Co., D. J., Wausau, Wis.
National Radiator Co., The, Johnstown, Pa.
●Rittling Corp., The, Hamburg, N. Y.
United States Radiator Corp., Detroit, Mich.
Utica Radiator Corp., Utica, N. Y.
Weil-McLain Co., Michigan City, Ind.
Wilson Engineering Corp., Chicago, Ill.

RADIATION, FIN TUBE TYPE

Airecon Industries, Detroit, Mich.
American Coils Co., Newark, N. J.
Auburn Burner Co., Auburn, Ind.
Autorad Inc., Chicago, Ill.
●Brown Products Co., Forest Hills, N. Y.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
●Fedders-Quigan Corp., Buffalo, N. Y.
●G & O Mfg. Co., New Haven, Conn.
●Kramer Trenton Co., Trenton, N. J.
●Kritzer Radiant Coils, Inc., Chicago, Ill.
Minimite Co., Chicago, Ill.
National Radiator Co., The, Johnstown, Pa.
Peerless of America, Inc., Chicago, Ill.
Radiant Baseboard Panels, Inc., New Britain, Conn.
Refrigeration Economics Co., Inc., Canton, O.
●Rempe Co., Chicago, Ill.
●Rittling Corp., The, Hamburg, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Shaw-Perkins Mfg. Co., Pittsburgh, Pa.
Slant-Fin Radiator Corp., Brooklyn, N. Y.
●Smith Co., Inc., H. B., The, Westfield, Mass.
Sterling Radiator Co., Inc., Westfield, Mass.
Super Radiator Corp., Minneapolis, Minn.
Tenney Engineering Inc., Newark, N. J.
●Tilco-Fin-Tubing Div., David E. Kennedy, Inc., Brooklyn, N. Y.
●Trane Co., The, La Crosse, Wis.
United States Radiator Corp., Detroit, Mich.
Vapor Heating Corp., Chicago, Ill.
●Vulcan Radiator Co., Hartford, Conn.
●Webster & Co., Warren, Camden, N. J.

RADIATOR AND CONVECTOR HUMIDIFIERS

See Humidifiers for Radiators and Convectors

RADIATOR HANGERS

See Hangers or Brackets, Radiator

RADIATOR ORIFICES

See Orifices, Radiator

RADIATOR ORIFICE VALVES

See Valves, Radiator, Orifice

RADIATOR VALVES

See Valves, Radiator

RADIATOR VENT VALVE HUMIDIFIERS

See Humidifiers, Radiator Vent Valve

RADIATORS, ELECTRIC

Acrow, Inc., Newark, N. J.
Burnham Corp., Boiler Div., Irvington, N. Y.
Conco Engineering Wks., Div. of H. D. Conkey & Co., Mendota, Ill.
Meco, Inc., Portland, Ore.
Trent, Inc., Philadelphia, Pa.

RADIATORS, GAS FIRED

Clow & Sons, James B., Chicago, Ill.

RADIATORS, HUMIDIFYING

Murray Mfg. Co., D. J., Wausau, Wis.

RATCHET WRENCHES

See Wrenches, Ratchet

REAMERS, PIPE

American Pipe Tool Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Beaver Pipe Tools, Inc., Warren, O.
Capewell Mfg. Co., Hartford, Conn.
Crown Die & Tool Co., Chicago, Ill.
Greenfield Tap & Die Corp., Greenfield, Mass.
Independent Pneumatic Tool Co., Aurora, Ill.
Mueller Co., Decatur, Ill.
Nye Tool Co., Chicago, Ill.
●Ridge Tool Co., Elyria, O.
Sac Tool Mfg. Co., St. Louis, Mo.
Toledo Pipe Threading Machine Co., Toledo, O.

RECIPROCATING PUMPS

See Pumps, Reciprocating

RECORDER-CONTROLLERS, COMBINED TEMPERATURE AND HUMIDITY

American Instrument Co., Silver Spring, Md.
Bristol Co., The, Waterbury, Conn.
Ess Instrument Co., Bergenfield, N. J.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
●Powers Regulator Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Instrument Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.

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RECORDER-CONTROLLERS, HUMIDITY

American Instrument Co., Silver Spring, Md.
Barber-Colman Co., Rockford, Ill.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
•Johnson Service Co., Milwaukee, Wis.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia, Pa.
•Powers Regulator Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
•Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.

RECORDER-CONTROLLERS, PRESSURE

Automatic Control Co., St. Paul, Minn.
Bailey Meter Co., Cleveland, O.
Baldwin Locomotive Wks., Eddystone Div., Eddystone, Pa.
Bristol Co., The, Waterbury, Conn.
Defender Instrument and Regulator Co., St. Louis, Mo.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
•Hays Corp., Michigan City, Ind.
Mason-Neilan Regulator Co., Boston, Mass.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Scientific Instrument Co., Detroit, Mich.
Shallcross Controls, Inc., Milwaukee, Wis.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
•Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
United States Gauge, Div. of American Machine and Metals, Inc., Sellersville, Pa.

RECORDER-CONTROLLERS, TEMPERATURE

American Instrument Co., Silver Spring, Md.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Defender Instrument and Regulator Co., St. Louis, Mo.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
•Johnson Service Co., Milwaukee, Wis.
Leeds & Northrup Co., Philadelphia, Pa.
Mason-Neilan Regulator Co., Boston, Mass.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
•Powers Regulator Co., Chicago, Ill.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.
Scientific Instrument Co., Detroit, Mich.
Shallcross Controls, Inc., Milwaukee, Wis.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
•Taylor Instrument Companies, Rochester, N. Y.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Trerice Co., H. O., Detroit, Mich.
United States Gauge, Div. of American Machine & Metals, Inc., Sellersville, Pa.
Wheelco Instrument Co., Chicago, Ill.

RECORDERS, CARBON DIOXIDE

Cole-Sewell Engineering Co., St. Paul, Minn.
Davis Instruments, Div. of Davis Emergency Equipment Co., Inc., Newark, N. J.
Defender Instrument and Regulator Co., St. Louis, Mo.
Engelhard, Inc., Charles, Newark, N. J.
Foxboro Co., Foxboro, Mass.
•Hays Corp., Michigan City, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia, Pa.
Permutit Co., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.

RECORDERS, COMBINED TEMPERATURE AND HUMIDITY

American Instrument Co., Silver Spring, Md.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
•Powers Regulator Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
•Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Weksler Thermometer Corp., New York, N. Y.

RECORDERS, DEW POINT

Foxboro Co., Foxboro, Mass.
•Surface Combustion Corp., Toledo, O.
Wallace & Tiernan Co., Inc., Newark, N. J.

RECORDERS, DRAFT

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Defender Instrument and Regulator Co., St. Louis, Mo.
Foxboro Co., Foxboro, Mass.
Hagan Corp., Pittsburgh, Pa.
•Hays Corp., Michigan City, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
Uehling Instrument Co., Paterson, N. J.

RECORDERS, HUMIDITY

American Instrument Co., Silver Spring, Md.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Garden City Instruments, Inc., Chicago, Ill.
Leeds & Northrup Co., Philadelphia, Pa.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
•Powers Regulator Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
•Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Weksler Thermometer Corp., New York, N. Y.

RECORDERS, LIQUID LEVEL

Automatic Control Co., St. Paul, Minn.
Bailey Meter Co., Cleveland, O.
Barton Instrument Corp., Los Angeles, Calif.
Bristol Co., The, Waterbury, Conn.
Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Defender Instrument & Regulator Co., St. Louis, Mo.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Hagan Corp., Pittsburgh, Pa.
•Hays Corp., Michigan City, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Liquidometer Corp., Long Island City, N. Y.
Mason-Neilan Regulator Co., Boston, Mass.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
•Taylor Instrument Companies, Rochester, N. Y.
Uehling Instrument Co., Paterson, N. J.
Westinghouse Electric Corp., Pittsburgh, Pa.
•Yarnall-Waring Co., Philadelphia, Pa.

RECORDERS, OXYGEN

Bailey Meter Co., Cleveland, O.
Hagan Corp., Pittsburgh, Pa.
•Hays Corp., Michigan City, Ind.
Mine Safety Appliances Co., Pittsburgh, Pa.

RECORDERS, PRESSURE AND VACUUM

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Baldwin Locomotive Wks., Eddystone Div., Eddystone, Pa.
Bristol Co., The, Waterbury, Conn.
Defender Instrument and Regulator Co., St. Louis, Mo.
Electric Auto-Lite Co., Instrument & Gauge Div., Toledo, O.
Electro Products Laboratories, Inc., Chicago, Ill.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Garden City Instruments, Inc., Chicago, Ill.

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Giannini & Co., Inc., Pasadena, Calif.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Mason-Neilan Regulator Co., Boston, Mass.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Stokes Machine Co., F. J., Philadelphia, Pa.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Uehling Instrument Co., Paterson, N. J.
United States Gauge, Div. of American Machine and Metals, Inc., Sellersville, Pa.
Weksler Thermometer Corp., New York, N. Y.

RECORDERS, SMOKE DENSITY

Bailey Meter Co., Cleveland, O.
●Combustion Control Corp., Cambridge, Mass.
De-Tec-Tronic Laboratories, Inc., Chicago, Ill.
Ess Specialty Corp., Bergenfield, N. J.
General Power Plant Corp., New York, N. Y.
Leeds & Northrup Co., Philadelphia, Pa.

RECORDERS, TEMPERATURE

American Instrument Co., Silver Spring, Md.
●Armstrong Machine Wks., Three Rivers, Mich.
Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Defender Instrument and Regulator Co., St. Louis, Mo.
Electric Auto-Lite Co., Instrument & Gauge Div., Toledo, O.
Engelhard, Inc., Charles, Newark, N. J.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
G. M. Mfg. Co., New York, N. Y.
Garden City Instruments, Inc., Chicago, Ill.
Gotham Instrument Co., Div., American Machine & Metals, Inc., Philadelphia, Pa.
H-B Instrument Co., Philadelphia, Pa.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Mason-Neilan Regulator Co., Boston, Mass.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
Moore Products Co., Philadelphia, Pa.
Palmer Thermometers, Inc., Cincinnati (Norwood), O. (Mercury-actuated)
Penn Industrial Instrument Corp., Philadelphia, Pa.
●Powers Regulator Co., Chicago, Ill.
Precision Scientific Co., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.
Republic Flow Meters Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Standard Thermometer, Inc., Boston, Mass.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Trerice Co., H. O., Detroit, Mich.
United States Gauge, Div. of American Machine and Metals, Inc., Sellersville, Pa.
Weksler Thermometer Corp., New York, N. Y.
Wheelco Instruments Co., Chicago, Ill.

RECORDING THERMOMETERS

See Recorders, Temperature

RECOVERY EQUIPMENT, AIR

See Adsorbers, Odor

REDUCERS, SPEED

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulley Co., Philadelphia, Pa.
Bodine Electric Co., Chicago, Ill.
Boston Gear Wks., Inc., North Quincy, Mass.
Brown-Brockmeyer Co., Inc., Dayton, O.
De Laval Steam Turbine Co., Trenton, N. J.
Doall Co., The, Des Plaines, Ill.
Falk Corp., Milwaukee, Wis.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Graham Transmissions, Inc., Milwaukee, Wis.
Janette Mfg. Co., Chicago, Ill.
Jones Foundry & Machine Co., W. A., Chicago, Ill.
Lima Electric Motor Co., The, Lima, O.
Link Belt Co., Philadelphia, Pa.
Medart Co., St. Louis, Mo.
Philadelphia Gear Works, Inc., Philadelphia, Pa.
Poole Foundry & Machine Co., Baltimore, Md.
Reliance Electric & Engineering Co., Cleveland, O.
Shallcross Controls, Inc., Milwaukee, Wis.
Smith Corp., Winfield H., Springville, N. Y.
Star-Kimball Electric Co., Bloomfield, N. J.
Steam Turbine Div., Worthington Pump & Machinery Corp., Wellsville, N. Y.
●Stephens-Adamson Mfg. Co., Aurora, Ill.
Sterling Electric Motors, Inc., Los Angeles, Calif.
U. S. Electrical Motors, Inc., Los Angeles, Calif.
Westinghouse Electric Corp., Pittsburgh, Pa.

REFRACTORIES AND REFRACTORY CEMENT

Allen Co., Robert G., Mechanicsville, N. Y.
●Armstrong Cork Co., Lancaster, Pa.
●Babcock & Wilcox Co., New York, N. Y.
Basic Refractories, Inc., Cleveland, O.
Bird-Archer Co., Philadelphia, Pa.
Botfield Refractories Co., Philadelphia, Pa.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Chicago Fire Brick Co., Chicago, Ill.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Fireline Stove & Furnace Lining Co., Chicago, Ill.
General Insulating Products Co., Brooklyn, N. Y.
Green Fire Brick Co., Mexico, Mo.
Johns-Manville, New York, N. Y.
Kellogg Co., M. W., The, New York, N. Y.
Krehbiel Co., J. H., Chicago, Ill.
Laclede-Christy Co., St. Louis, Mo.
McLeod & Henry Co., Inc., Troy, N. Y.
Monogram Products Co., Inc., Philadelphia, Pa.
Plibrico Jointless Firebrick Co., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
Pyrolite Products Co., Cleveland, O.
Quigley Co., Inc., New York, N. Y.
Ramtite Co., The, Chicago, Ill.
Refractory & Insulation Corp., New York, N. Y.
Rex Clay Products Co., Detroit, Mich.
Rutland Fire Clay Co., Rutland, Vt.
S.O.S. Products Co., Inc., Brooklyn, N. Y.
Saverite Engineering Co., Hoboken, N. J.
Standard Fuel Engineering Co., Detroit, Mich.
Taylor Sons Co., Charles, Cincinnati, O.
United States Stoneware Co., New York, N. Y.
Walsh Refractories Corp., St. Louis, Mo.
●Zonolite Co., Chicago, Ill.

REFRIGERANT DEHYDRATORS

See Dehydrators, Refrigerant

REFRIGERANT FILTERS

See Filters, Refrigerant

REFRIGERANT GAS PURGERS

See Purgers, Refrigerant Gas

REFRIGERANTS

Ansul Chemical Co., Refrigeration Div. Marinette, Wis. (methyl chloride, sulphur dioxide)
Armour Ammonia Wks., Chicago, Ill. (ammonia)
Dow Chemical Co., The, Midland, Mich.
du Pont de Nemours & Co., Inc., E. I. Polychemicals Dept., Wilmington, Del. (cylinder anhydrous ammonia, methyl chloride, sulphur dioxide, "Freon" refrigerants)
du Pont de Nemours & Co., Inc., E. I., Kinetic Chemicals Div., Wilmington, Del. ("Freon" fluorinated hydro carbon refrigerants)
du Pont de Nemours & Co., Inc., E. I., Electrochemicals Dept., Wilmington, Del. (Methyl chloride and methylene chloride)
Liquid Carbonic Corp., Chicago, Ill. (carbon dioxide)
Monsanto Chemical Co., Merimac Div., Boston, Mass. (anhydrous ammonia)
Pennsylvania Salt Mfg. Co., Philadelphia, Pa. (ammonia)
Pure Carbonic, Inc., Div. of Air Reduction Co., Inc., New York, N. Y. (carbon dioxide)
Solvay Sales Div., Allied Chemical & Dye Corp., New York, N. Y.
Virginia Smelting Co., West Norfolk, Va., (Methyl chloride, liquid sulphur dioxide, methylene chloride)

REFRIGERATING COMPRESSORS

See Compressors, Refrigerating

REFRIGERATION ACCUMULATORS

See Accumulators, Refrigeration

REFRIGERATION CONTROLS

See Valves, Refrigeration

● Advertisement in this issue. See Index to Advertisers, page 127d

REFRIGERATION FITTINGS

See Fittings, Refrigeration

REFRIGERATION MANIFOLDS

See Manifolds, Refrigeration

REFRIGERATION VALVES

See Valves, Refrigeration

REGISTERS

See also Diffusers; Grilles; Panels, Perforated, for Air Diffusion

A. & A. Register Co., Cleveland, O.
●A-J Mfg. Co., Kansas City, Mo.
Acme Mfg. Co., Philadelphia, Pa.
Air Control Products, Inc., Coopersville, Mich.
●Auer Register Co., Cleveland, O.
Barber-Colman Co., Rockford, Ill.
Best Register Co., Milwaukee, Wis.
Char-Gale Mfg. Co., Minneapolis, Minn.
Controlair Mfg. Co., Los Angeles, Calif.
Diamond Mfg. Co., Wyoming, Pa.
●Dole Valve Co., The, Chicago, Ill. (Thermostatic air control)
Empire Ventilation Equipment Co., Long Island City, N. Y.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
●Harrington & King Perforating Co., Chicago, Ill.
Hart & Cooley Mfg. Co., Holland, Mich.
Hendrick Mfg. Co., Carbondale, Pa.
●Independent Register Co., Cleveland, O.
Knowles Mushroom Ventilator Co., Upper Montclair, N. J.
Lima Register Co., The, Lima, O.
Metal Carrier Corp., Grand Rapids, Mich.
Midco Register Corp., St. Paul, Minn.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
Rock Island Register Co., Rock Island, Ill.
Smith Co., J. B., Philadelphia, Pa.
●Standard Stamping & Perforating Co., Chicago, Ill.
Stewart Mfg. Co., Inc., Cedar Grove, N. J.
●Titus Mfg. Corp., Waterloo, Ia.
●Tuttle & Bailey, Inc., New Britain, Conn.
United States Register Co., Battle Creek, Mich.
Viking Mfg. Corp., Cleveland, O.
Young Regulator Co., Cleveland, O.

REGISTER UNITS, FOR SECONDARY AIR SUPPLY FOR OIL BURNERS

Barber-Colman Co., Rockford, Ill.
Faber Engineering Co., Inc., Philadelphia, Pa.

REGULATORS, AIR VELOCITY

Barber-Colman Co., Rockford, Ill.
Hastings Instrument Co., Hampton, Va.
Hastings Instrument Co., Hampton, Va.
●Hays Corp., Michigan City, Ind.
●Johnson Service Co., Milwaukee, Wis.
●Powers Regulator Co., Chicago, Ill.
Shallcross Controls, Inc., Milwaukee, Wis.
●Taylor Instrument Companies, Rochester, N. Y.

REGULATORS, DAMPER SETS

A-P Controls Corp., Milwaukee, Wis.
Acme Mfg. Co., Philadelphia, Pa.
Acro Mfg. Co., The, Columbus, O.
Adams Co., The, Dubuque, Ia.
Air Control Products, Inc., Coopersville, Mich.
Barber-Colman Co., Rockford, Ill.
Cole-Sewell Engineering Co., St. Paul, Minn.
Crown Controls Co., Inc., New Bremen, O.
Detroit Lubricator Co., Detroit, Mich.
Field Control Div., H. D. Conkey & Co., Mendota, Ill.
Fossum, M. H., St. Paul, Minn.
Gerett Corp., M. A., Milwaukee, Wis.
Goese Mfg. Co., Milwaukee, Wis.
Hart & Cooley Mfg. Co., Holland, Mich.
Kerentoff, G. L., Cincinnati, O.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Ohio Products Co., Cleveland, O.
Parker-Kalon Corp., New York, N. Y.
●Penn Electric Switch Co., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
Sampsel Time Control, Inc., Spring Valley, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.
Shallcross Controls, Inc., Milwaukee, Wis.
●Trane Co., The, LaCrosse, Wis.
United States Register Co., Battle Creek, Mich.
Young Regulator Co., Cleveland, O.

REGULATORS, DRAFT, COMBUSTION

Askania Regulator Co., Chicago, Ill.
Atlas Utilities Co., Providence, R. I.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Campbell Engineering Co., Appleton, Wis.
Canton Stoker Corp., Canton, O.
●Cash Co., A. W., Decatur, Ill.
●Cleveland Fuel Equipment Co., Cleveland, O.
Cole-Sewell Engineering Co., St. Paul, Minn.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Engineer Co., New York, N. Y.
Engineered Products Co., Philadelphia, Pa.
Field Control Div., H. D. Conkey & Co., Mendota, Ill.
Foster Wheeler Corp., New York, N. Y.
Foxboro Co., Foxboro, Mass.
Fuelguard Co., Dallas, Tex.
General Blower Co., Inc., Philadelphia, Pa.
General Power Plant Corp., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
●Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
Kol-Master Corp., Oregon, Ill.
Krueger Sentry Gauge Co., Green Bay, Wis.
Leahy Mfg. Co., Los Angeles, Calif.
Locke Regulator Co., Salem, Mass.
Mason-Neilan Regulator Co., Boston, Mass.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
●Perfex Corp., Milwaukee, Wis.
Preferred Utilities Mfg. Corp., New York, N. Y.
Republic Flow Meters Co., Chicago, Ill. (Industrial)
Ruggles-Klingemann Mfg. Co., Boston, Mass.
Sampsel Time Control, Inc., Spring Valley, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
●Spence Engineering Co., Inc., Walden, N. Y.
●Webster Engineering Co., Tulsa, Okla.

REGULATORS, FLUID FLOW, FOR CONSTANT VOLUME

Independent of Pressure

Askania Regulator Co., Chicago, Ill.
Kates Co., W. A., Deerfield, Ill.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
Penn Industrial Instrument Corp., Philadelphia, Pa.

REGULATORS, LEVEL, LIQUID

Askania Regulator Co., Chicago, Ill.
Automatic Control Co., St. Paul, Minn.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Barber-Colman Co., Rockford, Ill.
Belfield Valve, Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Boylston Steam Specialty Co., Chicago, Ill.
Bristol Co., The, Waterbury, Conn.
Burrows Mfg. Co., F. A. York, Pa.
Cooper Co., Clark, Palmyra, N. J.
Coral Designs, Long Island City, N. Y.
Cutler-Hammer, Inc., Milwaukee, Wis.
Davis Regulator Co., Chicago, Ill.
Defender Instrument & Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Fischer & Porter Co., Hatboro, Pa.
●Fisher Governor Co., Marshalltown, Ia.
Foxboro Co., Foxboro, Mass.
Golden-Anderson Specialty Co., Pittsburgh, Pa.
Griscom-Russell Co., The, New York, N. Y.
Grove Regulator Co., Oakland, Calif.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
Johnson Corp., The, Three Rivers, Mich.
Kieley & Mueller, Inc., North Bergen, N. J.
Kisco Boiler & Engineering Co., St. Louis, Mo.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Liquidepth Indicators, Inc., Long Island City, N. Y.
Magnetrol, Inc., Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
Northern Equipment Co., Erie, Pa.
●Penn Electric Switch Co., Goshen, Ind.
Penn Industrial Instrument Corp., Philadelphia, Pa.
R-S Products Corp., Philadelphia, Pa.
●Sarco Co., Inc., New York, N. Y.
●Taylor Instrument Companies, Rochester, N. Y.
Trimount Instrument Co., Chicago, Ill.

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REGULATORS, PRESSURE, AIR

American Meter Co., Inc., New York, N. Y.
Askania Regulator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Barber-Colman Co., Rockford, Ill.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
●Binks Mfg. Co., Chicago, Ill.
Black Mfg. Co., The, Baltimore, Md.
Boylston Steam Specialty Co., Chicago, Ill.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Burrows Mfg. Co., F. A., York, Pa.
CCA Products, Inc., Glendale, Calif.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Clark Mfg. Co., Cleveland, O.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Cutler-Hammer, Inc., Milwaukee, Wis.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
DeVilbiss Co., The, Toledo, O.
Dockson Corp., Detroit, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Electric Sprayit Co., The, Sheboygan, Wis.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
Greiner Co., Emil, New York, N. Y.
Grove Regulator Co., Oakland, Calif.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
Hubbell Corp., Mundelein, Ill.
●Illinois Engineering Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Keller Tool Co., Grand Haven, Mich.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
●Mercoid Corp., The, Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Modern Engineering Co., St. Louis, Mo.
Monitor Controller Co., The, Boston, Mass.
Moore Products Co., Philadelphia, Pa.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
National Cylinder Gas Co., Chicago, Ill.
Norgren Co., C. A., Denver, Colo.
North Penn Co., New York, N. Y.
Norwalk Valve Co., Norwalk, Conn.
Paasche Airbrush Co., Chicago, Ill.
●Penn Electric Switch Co., Goshen, Ind.
Pittsburgh Equitable Meter Div., Rockwell Mfg. Co., Pittsburgh, Pa.
R-S Products Corp., Philadelphia, Pa.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
Schade Valve Mfg. Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
●Spence Engineering Co., Inc., Walden, N. Y.
Spray Engineering Co., Somerville, Mass.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Strong, Carlisle & Hammond Co., Cleveland, O.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Tryco Products, Inc., Westfield, Mass.
●United Electric Controls Co., Watertown, Mass.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.

REGULATORS, PRESSURE, GAS

●American District Steam Co., North Tonawanda, N. Y.
American Meter Co., Inc., New York, N. Y.
Askania Regulator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Barber-Colman Co., Rockford, Ill.
Barber Gas Burner Co., Cleveland, O.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Black Mfg. Co., The, Baltimore, Md.
Boylston Steam Specialty Co., Chicago, Ill.
Bristol Co., The, Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Clark Mfg. Co., Cleveland, O.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Dockson Corp., Detroit, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
Fox Control & Mfg. Co., Cleveland, O.
Foxboro Co., Foxboro, Mass.
Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
●General Controls Co., Glendale, Calif.
Greiner Co., Emil, New York, N. Y.
Grove Regulator Co., Oakland, Calif.
Hagan Corp., Pittsburgh, Pa.
Harris Calorific Co., The, Cleveland, O.
●Hays Corp., Michigan City, Ind.
Hubbell Corp., Mundelein, Ill.
●Illinois Engineering Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Liquid Carbonic Corp., The, Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
●Mercoid Corp., The, Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Modern Engineering Co., St. Louis, Mo.
Monitor Controller Co., The, Boston, Mass.
Moore Products Co., Philadelphia, Pa.
Mueller Co., Decatur, Ill.
●Mueller Furnace Co., L. J., Milwaukee, Wis.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
National Cylinder Gas Co., Chicago, Ill.
Norgren Co., C. A., Denver, Colo.
Norwalk Valve Co., South Norwalk, Conn.
●Penn Electric Switch Co., Goshen, Ind.
Pittsburgh Equitable Meter Div., Rockwell Mfg. Co., Pittsburgh, Pa.
Positive Control Co., The, Cincinnati, O.
●Powers Regulator Co., Chicago, Ill.
R-S Products Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill. (Industrial)
Ruggles Klingemann Mfg. Co., Boston, Mass.
Schade Valve Mfg. Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
●Spence Engineering Co., Inc., Walden, N. Y.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Staples & Pfeiffer, San Francisco, Calif.
Strong, Carlisle & Hammond Co., Cleveland, O.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Thermac Co., Los Angeles, Calif.
Trerice Co., H. O., Detroit, Mich.
●United Electric Controls Co., Watertown, Mass.
Wall Chemicals Div. of The Liquid Carbonic Corp., Chicago, Ill.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.

REGULATORS, PRESSURE, HOT WATER HEATING SYSTEMS

Bailey Co., Chas., M., San Francisco, Calif.
Barber-Colman Co., Rockford, Ill.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
●Bell & Gossett Co., Morton Grove, Ill.
Brooke Engineering Co., Inc., Philadelphia, Pa.
Burrows Mfg. Co., F. A., York, Pa.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chicago Specialty Mfg. Co., Chicago, Ill.
Clark Mfg. Co., Cleveland, O.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Detroit Lubricator Co., Detroit, Mich.
●Fisher Governor Co., Marshalltown, Ia.
●Illinois Engineering Co., Chicago, Ill.
Kainer and Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
●Mercoid Corp., The, Chicago, Ill.
Mueller Co., Decatur, Ill.
●Penn Electric Switch Co., Goshen, Ind.
Sall Bros. Co., Rockford, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, LaCrosse, Wis.
Watts Regulator Co., Lawrence, Mass.
●White-Rodgers Electric Co., St. Louis, Mo.
Yula Water Heaters Inc., New York, N. Y.

REGULATORS, PRESSURE, LIQUID

Askania Regulator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Automatic Control Co., St. Paul, Minn.

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Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Barber-Colman Co., Rockford, Ill.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Boylston Steam Specialty Co., Chicago, Ill.
Brooke Engineering Co., Inc., Philadelphia, Pa.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Clark Controller Co., Cleveland, O.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
Foxboro Co., Foxboro, Mass.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
●Healy Ruff Co., St. Paul, Minn.
Hubbell Corp., Mundelein, Ill.
●Johnson Service Co., Milwaukee, Wis.
Justus Steam Trap Co., Napanoch, N. Y.
Keckley Co., O. C., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Locke Regulator Co., Salem, Mass.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Monarch Mfg. Wks., Inc., Philadelphia, Pa.
Monitor Controller Co., The, Boston, Mass.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
Norgren Co., C. A., Denver, Colo.
●Penn Electric Switch Co., Goshen, Ind.
●Powers Regulator Co., Chicago, Ill.
R-S Products Corp., Philadelphia, Pa.
Republic Flow Meters Co., Chicago, Ill.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
Schade Valve Mfg. Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
●Spence Engineering Co., Inc., Walden, N. Y.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Staples & Pfeiffer, San Francisco, Calif.
Stickle Steam Specialties Co., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., Cleveland, O.
●Swartwout Co., Cleveland, O.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Tryco Products, Inc., Westfield, Mass.
●United Electric Controls Co., Watertown, Mass.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
●White-Rodgers Electric Co., St. Louis, Mo.
Williams Gauge Co., The, Pittsburgh, Pa. (Feed water)

REGULATORS, STATIC PRESSURE, AIR DUCT

Bailey Co., Chas. M., San Francisco, Calif.
Barber-Colman Co., Rockford, Ill.
Bristol Co., The, Waterbury, Conn.
●Cash Co., A. W., Decatur, Ill.
Cooper Co., Clark, Palmyra, N. J.
Coral Designs, Long Island City, N. Y.
●Hays Corp., Michigan City, Ind.
●Johnson Service Co., Milwaukee, Wis.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Powers Regulator Co., Chicago, Ill.
Shallcross Controls, Inc., Milwaukee, Wis.

REGULATORS, TEMPERATURE

A-P Controls Corp., Milwaukee, Wis.
Acro Mfg. Co., The, Columbus, O.
American Instrument Co., Silver Spring, Md.
Atlas Valve Co., Newark, N. J.
Autempco Corp., New York, N. Y.
Automatic Devices Co., Inc., Chicago, Ill.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Barber-Colman Co., Rockford, Ill.
●Bell & Gossett Co., Morton Grove, Ill.
Bristol Co., The, Waterbury, Conn.
Burling Instrument Co., Newark, N. J.
Cooper Co., Clark, Palmyra, N. J.
Crown Controls Co., Inc., New Bremen, O.
Cutler-Hammer, Inc., Milwaukee, Wis.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Detroit Lubricator Co., Detroit, Mich.
●Dunham Co., C. A., Chicago, Ill.
Eastern Industries, Inc., New Haven, Conn.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Edison, Inc., Thomas A., Instrument Div., West Orange, N. J.
Farris Stacon Corp., Palisades Park, N. J.
Fenwal, Inc., Ashland, Mass.
Foster Engineering Co., Union, N. J.
Foxboro Co., Foxboro, Mass.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
●General Controls Co., Glendale, Calif.
Gleason-Avery, Inc., Auburn, N. Y.
H-B Instrument Co., Philadelphia, Pa.
Hagan Corp., Pittsburgh, Pa.
Hart Mfg. Co., The, Hartford, Conn.
●Hays Corp., Michigan City, Ind.
Heat Timer Corp., New York, N. Y.
●Illinois Engineering Co., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
Keckley Co., O. C., Chicago, Ill.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
Lawler Automatic Controls, Inc., Mount Vernon, N. Y.
●Leslie Co., Lyndhurst, N. J.
Locke Regulator Co., Salem, Mass.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
●Marsh Corp., Jas. P., Skokie, Ill.
McAlear Mfg. Co., Chicago, Ill.
McCorkle Co., D. H., Berkeley, Calif.
●Mercoid Corp., Chicago, Ill.
Miller-Harris Instrument Co., Milwaukee, Wis.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
●Penn Electric Switch Co., Goshen, Ind.
Penn Industrial Instrument Corp., Philadelphia, Pa.
●Perfex Corp., Milwaukee, Wis.
●Powers Regulator Co., Chicago, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.
R-S Products Corp., Philadelphia, Pa.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Scientific Instrument Co., Detroit, Mich.
●Spence Engineering Co., Inc., Walden, N. Y.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
●Sterling, Inc., Milwaukee, Wis.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Taylor Instrument Companies, Rochester, N. Y.
Thermac Co., Los Angeles, Calif.
Trerice Co., H. O., Detroit, Mich.
Triplex Heating Specialty Co., Inc., Peru, Ind.
●United Electric Controls Co., Watertown, Mass.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
Wheelco Instruments Co., Chicago, Ill.
White Mfg. Co., St. Paul, Minn.
●White-Rodgers Electric Co., St. Louis, Mo.

RELAYS, ELECTRICAL

Advance Electric and Relay Co., Burbank, Calif.
●Allen-Bradley Co., Milwaukee, Wis.
Allied Control Co., Inc., New York, N. Y.
American Gas Accumulator Co., Elizabeth, N. J. (time delay)
American Instrument Co., Silver Spring, Md.
Arrow-Hart & Hegeman Elect. Co., Hartford, Conn.
Autempco Corp., New York, N. Y.
Automatic Electric Mfg. Co., Mankato, Minn.
●Automatic Switch Co., Orange, N. J.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
B/W Controller Corp., Birmingham, Mich.
Barber-Colman Co., Rockford, Ill.
Benjamin Electric Mfg. Co., Des Plaines, Ill.
Clark Controller Co., Cleveland, O.
Consolidated Car Heating Co., Inc., Albany, N. Y.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer Inc., Milwaukee, Wis.
Davis & Co., Dean W., Kentland, Ind.
Detroit Lubricator Co., Detroit, Mich.
Durakool, Inc., Elkhart, Ind.
Edison, Inc., Thos. A., Instrument Div., West Orange, N. J.
Electro-Switch & Controls Inc., Culver City, Calif.
Ess Instrument Co., Bergenfield, N. J.
●General Controls Co., Glendale, Calif.
●General Electric Co., Apparatus Dept., Schenectady, N.Y.
Gleason-Avery, Inc., Auburn, N. Y.

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Guardian Electric Mfg. Co., Chicago, Ill.
Hart Mfg. Co., The, Hartford, Conn.
H-B Instrument Co., Philadelphia, Pa.
Industrial Engineering Corp., Terre Haute, Ind.
Leach Relay Co., Los Angeles, Calif.
McCorkle Co., D. H., Berkeley, Calif.
McQuay-Norris Mfg. Co., St. Louis, Mo.
●Mercoid Corp., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Monitor Controller Co., The, Boston, Mass.
National Time & Signal Corp., Detroit, Mich.
●Penn Electric Switch Co., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
Philadelphia Thermometer Co., Philadelphia, Pa.
Potter & Brumfield Sales Co., Princeton, Ind.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Sampsel Time Control, Inc., Spring Valley, Ill.
Skaneateles Mfg. Co., Inc., Syracuse, N. Y.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Struthers-Dunn, Inc., Philadelphia, Pa.
Synchro-Start Products, Inc., Chicago, Ill.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Thrush & Co., H. A., Peru, Ind.
Tork Clock Co., Inc., Mt. Vernon, N. Y.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Wallace & Tiernan Co., Inc., Newark, N. J.
●Ward Leonard Electric Co., Mt. Vernon, N. Y.
Westinghouse Electric Corp., Pittsburgh, Pa.
Weston Electrical Instrument Corp., Newark, N. J.
●White-Rodgers Electric Co., St. Louis, Mo.
Zenith Electric Co., Chicago, Ill.

RELIEF VALVES

See Valves, Relief

REPAIR CLAMPS

See Clamps, Pipe Repair

REPAIR PLUGS FOR TANKS

See Plugs, Repair, for Tanks

RESEATERS, VALVE

Chicago Specialty Mfg. Co., Chicago, Ill.
Economy Valve Seat Co., Chicago, Ill.
Independent Pneumatic Tool Co., Aurora, Ill.
Leavitt Machine Co., Orange, Mass.
Skinner Co., M. B., South Bend, Ind.
Standard Reseater Corp., New York, N. Y.

REVERSE REFRIGERATION CYCLE UNITS

See Units, Air Conditioning, Reverse Refrigeration Cycle

RINGS, PISTON, FOR COMPRESSORS

McQuay-Norris Mfg. Co., St. Louis, Mo.
Perfect Circle Corp., Hagerstown, Md.
Piston Ring Div., Koppers Co., Inc., Baltimore, Md.
Sealed Power Corp., Muskegon, Mich.

RINGS, WELDING

Flori Pipe Co., The, St. Louis, Mo.
Tube Turns, Inc., Louisville, Ky.
Wedge Protectors, Inc., Cleveland, O.

ROD, GAS WELDING

Air Reduction Sales Co., New York, N. Y.
All-State Welding Alloys Co., Inc., White Plains, N. Y.
Allied Weld-Craft, Inc., Indianapolis, Ind.
Aluminum Co. of America, Pittsburgh, Pa.
American Brass Co., Waterbury, Conn.
American Steel & Wire Co., United States Steel Corp., Subsidiary, Cleveland, O.
Atlantic Steel Co., Atlanta, Ga.
Bridgeport Brass Co., Bridgeport, Conn.
Crucible Steel Co. of America, New York, N. Y.
Dow Chemical Co., The, Midland, Mich.
Duraloy Co., Scottdale, Pa. (Stainless)
Eutectic Welding Alloys Corp., New York, N. Y.
International Nickel Co., Inc., The, New York, N. Y.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Marquette Mfg. Co., Minneapolis, Minn.
Maurath, Inc., Cleveland, O.
Mir-O-Col Alloy Co., Los Angeles, Calif. (for hard facing)
Modern Engineering Co., St. Louis, Mo.
National Cylinder Gas Co., Chicago, Ill.
Page Steel & Wire Division of American Chain & Cable Co., Inc., Monessen, Pa.

●Revere Copper and Brass, Incorporated, New York, N. Y.
●Youngstown Sheet & Tube Co., Youngstown, O.

ROLLER BEARINGS

See Bearings, Roller

ROOF COOLERS

See Systems, Roof Spraying

ROOF SPRAYING SYSTEMS

See Systems, Roof Spraying

ROOF VENTILATORS

See Ventilators, Roof

ROOM HUMIDIFIERS

See Humidifiers, Unit, Room Type; and Units, Air Conditioning, Winter

ROOM THERMOSTATS

See Thermostats, Room or Wall

ROTARY PUMPS

See Pumps, Rotary

RUBBER BELTING

See Belting, Flat, Rubber

RUBBER PACKING

See Packing, Rubber and Synthetic

RUBBER PIPE

See Pipe, Hard Rubber

SADDLE VALVES

See Valves, Saddle

SAFETY VALVES

See Valves, Safety, Steam

SCAFFOLDS, PORTABLE

American Ladder & Scaffold Co., Miami, Fla.
Beaver Art Metal Corp., Ellwood City, Pa.
Up-Right Scaffolds, Berkeley, Calif.

SCALE CONTROL

See Devices, Electrolytic; Treatment, Steam System; Treatment, Water

SCALE REMOVAL, CHEMICAL SERVICE FOR

Anderson-Stolz Corp., Kansas City, Mo.
Aqua Electric Scale Control, Inc., Cleveland, O. (electric scale control)
Brown Electro Co., Oklahoma City, Okla. (electrolytic protector)
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Dearborn Chemical Co., Chicago, Ill.
Dowell Inc., Tulsa, Okla.
Madden & Co., P. E., Chicago, Ill.
Oakite Products, Inc., New York, N. Y.
O'Brien Industries, Jersey City, N. J.

SCREENS, SUN REFLECTING

Ingersoll Products Div., Borg-Warner Corp., Chicago, Ill.
●Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Kane Mfg. Corp., Kane, Pa.

SCREWS, SHEET METAL

Aluminum Co. of America, Pittsburgh, Pa.
American Screw Co., Willimantic, Conn.
Continental Screw Co., New Bedford, Mass.
Elco Tool & Screw Corp., Rockford, Ill.
Industrial Screw Co., Chicago, Ill.
Lamson & Sessions Co., Cleveland, O.
National Lock Co., Inc., Rockford, Ill.
Parker-Kalon Corp., New York, N. Y.
Pheoll Mfg. Co., Chicago, Ill.
Rockford Screw Products Co., Rockford, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Brass Goods Div., Waterville, Conn.
Shakeproof, Inc., Chicago, Ill.
United States Register Co., Battle Creek, Mich.

SEALS, SHAFT, MECHANICAL

Cook Electric Co., Chicago, Ill.
Crane Packing Co., Chicago, Ill.
Felt Products Mfg. Co., Chicago, Ill.
Garlock Packing Co., Palmyra, N. Y.
Johns-Manville, New York, N. Y.

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Morganite, Inc., Carbon Specialties Div., Long Island City, N. Y.
Peerless Pump Div., Food Machinery and Chemical Corp., Los Angeles, Calif.
Rotary Seal Co., Chicago, Ill.
Schwitzer-Cummins Co., Indianapolis, Ind.
Sealol Corp., Providence, R. I.
Syntron Co., Homer City, Pa.

SEAMLESS PIPE

See Pipe, Steel, Seamless

SEPARATORS, AIR

Adams Co., Inc., R. P., Buffalo, N. Y.
●Binks Mfg. Co., Chicago, Ill.
Bowser, Inc., Fort Wayne, Ind.
Centrifix Corp., Cleveland, O.
Clark Mfg. Co., Cleveland, O.
Cochrane Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
DeVilbiss Co., The, Toledo, O.
●Dollinger Corp., Rochester, N. Y.
Gasflux Co., Mansfield, O.
Goodyer Industries, Inc., Chicago, Ill.
Hagan Corp., Pittsburgh, Pa.
●Illinois Engineering Co., Chicago, Ill.
Johnson Corp., Three Rivers, Mich.
Keckley Co., O. C., Chicago, Ill.
Kraissl Co., Inc., The, Hackensack, N. J.
Leavitt Machine Co., Orange, Mass.
Logan Engineering Co., Chicago, Ill.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
Spencer Turbine Co., Hartford, Conn.
Spray Engineering Co., Somerville, Mass.
Strong,Carlisle & Hammond Co., Cleveland, O.
●Swartwout Co., Cleveland, O.
Textile Corp., Chicago, Ill.
Trerice Co., H. O., Detroit, Mich.
Wright-Austin Co., Detroit, Mich.

SEPARATORS, FLANGE

Kraissl Co., Inc., The, Hackensack, N. J.
Williams & Co., J. H., Buffalo, N. Y.

SEPARATORS, STEAM AND OIL

●Acme Industries, Inc., Jackson, Mich.
Adams Co., Inc., R. P., Buffalo, N. Y.
●American District Steam Co., North Tonawanda, N. Y.
Aminco Refrigeration Products Co., Detroit, Mich.
Armstrong Co., Richard M., Westchester, Pa.
Boylston Steam Specialty Co., Chicago, Ill.
Centrifix Corp., Cleveland, O. (Gas and Vapor)
Clark Mfg. Co., Cleveland, O.
Cochrane Corp., Philadelphia, Pa.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
●Fisher Governor Co., Marshalltown, Ia.
Goodyer Industries, Inc., Chicago, Ill.
Hagan Corp., Pittsburgh, Pa.
Hoppes Mfg. Co., Inc., Springfield, O.
●Illinois Engineering Co., Chicago, Ill.
Johnson Corp., The, Three Rivers, Mich.
Kieley & Mueller, Inc., North Bergen, N. J.
Kraissl Co., Inc., The, Hackensack, N. J.
Morehead Mfg. Co., Detroit, Mich.
National Valve & Mfg. Co., Pittsburgh, Pa.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
Richmond Engineering Co., Inc., Richmond, Va.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
Strong,Carlisle & Hammond Co., Cleveland, O.
●Swartwout Co., Cleveland, O.
Temprite Products Corp., Birmingham, Mich.
Textite Corp., Chicago, Ill.
Thermix Corp., The, Greenwich, Conn.
Wabash Mfg. Co., Chicago, Ill.
Warner Lewis Co., Tulsa, Okla.
●Webster & Co., Warren, Camden, N. J.
Wilson Engineeering Corp., Chicago, Ill.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
Wright-Austin Co., Detroit, Mich.

SEWAGE EJECTORS

See Ejectors, Sewage

SEWAGE PUMPS

See Pumps, Sewage

SHAFT SEALS, MECHANICAL

See Seals, Shaft, Mechanical

SHAFTS, FLEXIBLE, PUSH-PULL, FOR CONTROL

Arena Controls, Inc., Chicago, Ill.
Mall Tool Co., Chicago, Ill.
Piezo Mfg. Corp., New York, N. Y.
Stow Mfg. Co., Binghamton, N. Y.

SHEARS, ELECTRICAL, PORTABLE

Black & Decker Mfg. Co., Towson, Md.
G. D. S. Machinery & Supply Co., Inc., New York, N. Y.
Independent Pneumatic Tool Co., Aurora, Ill.
M-M-A, Inc., Lancaster, Pa.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Skilsaw, Inc., Chicago, Ill.
Stanley Electric Tools, Div. of The Stanley Works, New Britain, Conn.
Van Dorn Electric Tool Co., Towson, Md.

SHEARS, POWER

Barth Mfg. Co., Milldale, Conn.
Bertsch & Co., Inc., Cambridge City, Ind.
Bliss Co., E. W., Detroit, Mich.
Buckeye Tools Corp., Dayton, O.
●Buffalo Forge Co., Buffalo, N. Y.
Cincinnati Shaper Co., Cincinnati, O.
Cleveland Punch & Shear Works Co., Cleveland, O.
Cleveland Tramrail Div., Cleveland Crane & Eng. Co., Wickliffe, O.
Diamond Machine Tool Co., Los Angeles, Calif.
Dreis Co., Ltd., Edward J., San Carlos, Calif.
Excelsior Tool & Machine Co., East St. Louis, Ill.
Famco Machine Co., Racine, Wis.
Frederick Iron & Steel Inc., Frederick, Md.
H-A Mfg. Co., York, Pa.
Heartley Machine & Tool Co., Toledo, O.
Hendley & Whittemore, Beloit, Wis.
Kling Bros. Engineering Works, Chicago, Ill.
Libert Machine Co., Green Bay, Wis.
Marshalltown Mfg. Co., Marshalltown, Ia.
Niagara Machine & Tool Wks., Buffalo, N. Y.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Peck, Stow & Wilcox Co., Southington, Conn.
Quickwork Div., Whiting Corp., Harvey, Ill.
St. Louis Tool Co., St. Louis, Mo.
Streine Tool & Mfg. Co., New Bremen, O.
Whiting Corp., Harvey, Ill.
Whitney Metal Tool Co., Rockford, Ill.
Wysong & Miles, Greensboro, N. C.

SHEARS AND SNIPS, HAND

Armstrong-Blum Mfg. Co., Chicago, Ill.
Bartlett Mfg. Co., Detroit, Mich.
Beverly Shear Mfg. Co., Chicago, Ill.
Black & Decker Mfg. Co., Towson, Md. (electrically driven)
Bremil Mfg. Co., Erie, Pa.
Champion Blower & Forge Co., Lancaster, Pa.
Crecent Tool Co., Jamestown, N. Y.
Excelsior Tool & Machine Co., East St. Louis, Ill.
G. D. S. Machinery & Supply Co., Inc., New York, N. Y.
Grobet File Corp. of America, New York, N. Y.
Henkel-Clauss Co., The, Fremont, O.
Kidder Mfg. Co., Inc., J. F., Burlington, Vt. (Angle)
Klenk's Aviation Snips, Wilmington, Del.
Niagara Machine & Tool Wks., Buffalo, N. Y.
O'Neil-Irwin Mfg. Co., Lake City, Minn.
Pacific Machine & Iron Wks., Tacoma, Wash.
Peck, Stow & Wilcox Co., Southington, Conn.
Snap-on Tools Corp., Kenosha, Wis.
Viking Shear Co., Erie, Pa.
Whitney Mfg. Co., W. A., Rockford, Ill.
Whitney Metal Tool Co., Rockford, Ill.
Wiss & Sons Co., J., Newark, N. J.

SHEAVES

See Pulleys and Sheaves, for Belt Drives

SHEET METAL BRAKES

See Brakes, Sheet Metal

SHEET METAL DUCTS

See Ducts and Duct Fittings, Prefabricated

SHEET METAL FITTINGS

See Ducts and Duct Fittings, Prefabricated

SHEET METAL PUNCHES

See Punches, Sheet Metal

SHEET, ALUMINUM

Aluminum Co. of America, Pittsburgh, Pa.
American Nickeloid Co., Peru, Ill. (Nickel and chromium plated)
Colonial Alloys Co., Metals Div., Philadelphia, Pa.
Fairmont Aluminum Co., Fairmont, W. Va.

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●Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Reynolds Metals Co., Louisville, Ky.

SHEETS, ALUMINUM COATED

Armco Steel Corp., Middletown, O.

SHEETS AND BOARD, NON-METALLIC, FOR DUCT CONSTRUCTION

Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Celotex Corp., The, Chicago, Ill.
Grant Wilson Inc., Chicago, Ill.
Johns-Manville, New York, N. Y.
●Keasbey & Mattison Co., Ambler, Pa.
Keystone Asphalt Products Co., Chicago, Ill.
Ruberoid Co., New York, N. Y.
Sall Mountain Co., Chicago, Ill.
Technical Ply-Woods, Chicago, Ill.
United States Gypsum Co., Chicago, Ill.

SHEETS, CLAD

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Aluminum Co. of America, Pittsburgh, Pa.
American Nickeloid Co., Peru, Ill.
Follansbee Steel Corp., Pittsburgh, Pa.
General Plate Div., Metals & Controls Corp., Attleboro, Mass.
Ingersoll Steel Div., Borg-Warner Corp., Chicago, Ill.
Jessop Steel Co., Washington, Pa.
Lukens Steel Co. and Divisions, Coatsville, Pa.
●Revere Copper & Brass, Inc., New York, N. Y.

SHEETS, COPPER

American Brass Co., Waterbury, Conn.
American Nickeloid Co., Peru, Ill. (Nickel and chromium plated)
Bridgeport Brass Co., Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Hussey & Co., C. G., Pittsburgh, Pa.
New Haven Copper Co., Seymour, Conn.
●Revere Copper and Brass, Inc., New York, N. Y.
Western Brass Mills, Div. of Olin Industries, Inc., East Alton, Ill. (Brass, bronze, phosphor bronze)

SHEETS, LEAD

Alpha Metals, Inc., Brooklyn, N. Y.
Belmont Smelting & Refining Wks., Inc., Brooklyn, N. Y.
Division Lead Co., Chicago, Ill.
Eagle-Picher Co., Cincinnati, O.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Flemm Lead Co., Inc., Long Island City, N. Y.
Illinois Zinc Co., Chicago, Ill.
Lissberger & Son, Inc., Marks, Long Island City, N. Y.
National Lead Co., New York, N. Y.
Northwest Lead Co., Seattle, Wash.
Rochester Lead Wks., Rochester, N. Y.
Standard Rolling Mills, Inc., Brooklyn, N. Y.
Weirton Steel Co., Weirton, W. Va. (Alloy coated)

SHEETS, MAGNESIUM ALLOY

Dow Chemical Co., The, Midland, Mich.

SHEETS, METAL, WITH PROTECTIVE NON-METALLIC COATING

American Nickeloid Co., Peru, Ill.
American Steel Band Co., Pittsburgh, Pa.
Cheney Flashing Co., Trenton, N. J.
Plasteel-Products Co., Washington, Pa.
Robertson Co., H. H., Pittsburgh, Pa.
Technical Ply-Woods, Chicago, Ill. (Metal and plywood)

SHEETS, NICKEL AND NICKEL ALLOY

American Nickeloid Co., Peru, Ill.
International Nickel Co., Inc., The, New York, N. Y.
Lukens Steel Co. and Divisions, Coatesville, Pa.
●Revere Copper and Brass Incorporated, New York, N. Y.
Western Brass Mills, Div. of Olin Industries, Inc., East Alton, Ill.

SHEETS, STEEL, COPPER BEARING

Armco Steel Corp., Middletown, O.
Berger Mfg. Div., Republic Steel Corp., Canton, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., (Sub. United States Steel Corp.), San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Follansbee Steel Corp., Pittsburgh, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., Chicago, Ill.
Lukens Steel Co. and Divisions, Coatesville, Pa.
Lyon, Conklin & Co., Inc., Baltimore, Md. (Chromium, nickel, copper, iron alloy)
Newport Steel Corp., Rolling Mill Div., Newport, Ky.
Niles Rolling Mill Co., Niles, O.
Republic Steel Corp., Cleveland, O.
Sharon Steel Corp., Sharon, Pa.
●Tennessee Coal, Iron & Railroad Co., United States Steel Corp., Subsidiary, Birmingham, Ala.
●United States Steel Co., Pittsburgh, Pa.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
●Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS, STEEL, GALVANIZED

Apollo Steel Co., Apollo, Pa.
Armco Steel Corp., Middletown, O.
Berger Mfg. Div., Republic Steel Corp., Canton, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co. (Sub. United States Steel Corp.), San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Empire Sheet & Tin Plate Co., Mansfield, O.
Inland Steel Co., Chicago, Ill.
Newport Steel Corp., Rolling Mill Div., Newport, Ky.
Niles Rolling Mill Co., Niles, O.
Republic Steel Corp., Cleveland, O.
Sharon Steel Corp., Sharon, Pa.
●Tennessee Coal, Iron & Railroad Co., United States Steel Corp., Subsidiary, Birmingham, Ala.
●United States Steel Co., Pittsburgh, Pa.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Wood Steel Co., Alan, Conshohocken, Pa.

SHEETS, STEEL, GALVANNEALED

Berger Mfg. Div., Republic Steel Corp., Canton, O.
Continental Steel Corp., Kokomo, Ind.
Newport Steel Corp., Rolling Mill Div., Newport, Ky.
Niles Rolling Mill Co., Niles, O.
Republic Steel Corp., Cleveland, O.
Sharon Steel Corp., Sharon, Pa.
●United States Steel Co., Pittsburgh, Pa.

SHEETS, STEEL, STAINLESS

Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Nickeloid Co., Peru, Ill.
Armco Steel Corp., Middletown, O.
Berger Mfg. Div., Republic Steel Corp., Canton, O.
Crucible Steel Co. of America, New York, N. Y.
Duriron Co., Inc., The, Dayton, O.
Eastern Stainless Steel Corp., Baltimore, Md.
Ingersoll Steel Div., Borg-Warner Corp., Chicago, Ill.
Jessop Steel Co., Washington, Pa.
Republic Steel Corp., Cleveland, O.
Sharon Steel Corp., Sharon, Pa.
Superior Steel Corp., Pittsburgh, Pa.
●Tennessee Coal, Iron & Railroad Co., United States Steel Corp., Subsidiary, Birmingham, Ala.
●United States Steel Co., Pittsburgh, Pa.
Universal Cyclops Steel Corp., Bridgeville, Pa.
Washington Steel Corp., Washington, Pa.

SHEETS, WROUGHT IRON

Byers Co., A. M., Pittsburgh, Pa.

SHEETS, ZINC

American Nickeloid Co., Peru, Ill. (Nickel and chromium plated)
American Zinc Products Div., Ball Brothers Co., Greencastle, Ind.
Belmont Smelting & Refining Wks., Inc., Brooklyn, N. Y.
Hegeler Zinc Co., Danville, Ill.
Illinois Zinc Co., Chicago, Ill.
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
New Jersey Zinc Sales Co., New York, N. Y.

SHUTTERS

See Louvers and Shutters

SIGHT GLASSES

See Glasses, Sight, for Pipe Lines

SIGNALS, LIQUID LEVEL

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SIGNALS, TANK FILL

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SLEEVES, PIPE REPAIR

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SLIME AND ALGAE CONTROL, WATER TREATMENT FOR

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SMOKE ALARMS

See Alarms, Smoke

SMOKE ELIMINATORS

See Jets, Overfire Air, for Smoke Abatement

SMOKE GUNS

See Guns and Pots, Smoke and Smudge

SMUDGE POTS

See Guns and Pots, Smoke and Smudge

SOFTENERS, WATER

Alrose Chemical Co., Providence, R. I.
American Water Softener Co., Philadelphia, Pa.
American Well Works, Aurora, Ill.
Anderson-Stolz Corp., Kansas City, Mo.
Bogue Electric Co., Paterson, N. J.
Cochrane Corp., Philadelphia, Pa.
Duro Co., Dayton, O.
Elgin Softener Corp., Elgin, Ill.
General Filter Co., Ames, Ia.
Heilman Boiler Wks., Inc., Allentown, Pa.
Liquid Conditioning Corp., Philadelphia, Pa.
MacDermid Chemical Co., Bristol, Conn.
Permutit Co., New York, N. Y.
Red Jacket Mfg. Co., Davenport, Ia.
Refinite Corp., Omaha, Neb.
●Research Products Corp., Madison, Wis.
Sta-Rite Products, Inc., Delavan, Wis.
Uniflow Mfg. Co., Erie, Pa.
Warlo Corp., New York, N. Y.

SOLAR HEAT RESISTING SCREENS

See Screens, Sun Reflecting

SOLDER (SILVER), BRAZING ALLOYS, AND FLUXES

Air Reduction Sale Co., New York, N. Y.
All-State Welding Alloys Co., Inc., White Plains, N. Y.
Allen Co., Inc., L. B., Chicago, Ill.
American Brass Co., Waterbury, Conn.
Atkins & Co., E. C., Indianapolis, Ind.
Baker & Co., Inc., Newark, N. J.
Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Division Lead Co., Chicago, Ill.
Eutectic Welding Alloys Corp., New York, N. Y.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
General Plate Div., Metals & Controls Corp., Attleboro, Mass.
Handy & Harman, New York, N. Y.
Hardy, Inc., Charles, New York, N. Y.
Industrial Service Laboratories, Milwaukee, Wis.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Johnson Mfg. Co., Inc., Mt. Vernon, Ia.
Marquette Mfg. Co., Minneapolis, Minn.
●Mueller Brass Co., Port Huron, Mich.
National Cylinder Gas Co., Chicago, Ill.
Powder Weld Process Co., The, Brooklyn, N. Y.
Soldering Specialties Co., Summit, N. J.
Special Chemicals Corp., New York, N. Y.
Sulflo, Inc., Elizabeth, N. J.
Wabash Mfg. Co., Chicago, Ill.

SOLDER (TIN-LEAD), AND FLUXES

Allen Co., Inc., L. B., Chicago, Ill.
All-State Welding Alloys Co., Inc., White Plains, N. Y.
Alpha Metals, Inc., Brooklyn, N. Y.
Alsoco Corp., New York, N. Y. (Aluminum solder)
American Brass Co., Waterbury, Conn.
American Solder & Flux Co., Philadelphia, Pa.
Belmont Smelting & Refining Works, Inc., Brooklyn, N. Y.
Benson Co., Inc., Alex R., Hudson, N. Y.
Burnley Battery & Mfg. Co., North East, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Division Lead Co., Chicago, Ill.
du Pont de Nemours & Co., E. I., Grasselli Chemicals Dept., Wilmington, Del.
Eagle-Picher Co., Cincinnati, O.
Eutectic Welding Alloys Corp., New York, N. Y.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
Flemm Lead Co., Inc., Long Island City, N. Y.
Galv-Weld Products, Lima, O.
Gardiner Metal Co., Chicago, Ill.
Glaser Lead Co., Inc., Brooklyn, N. Y.
Hercules Chemical Co., Inc., New York, N. Y.
Industrial Service Laboratories, Milwaukee, Wis.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Johnson Mfg. Co., Inc., Mt. Vernon, Ia.
Johnson Foil Mfg. Co., The, St. Louis, Mo.
Kester Solder Co., Chicago, Ill.
Klauer Mfg. Co., Dubuque, Ia.
Lake Chemical Co., Chicago, Ill.
Lenk Mfg. Co., Boston, Mass.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Lissberger & Son, Inc., Marks, Long Island City, N. Y.
Merchant & Evans Co., Philadelphia, Pa.
●Mueller Brass Co., Port Huron, Mich.
National Lead Co., New York, N. Y.
Northwest Lead Co., Seattle, Wash.
Paul-Lewis Laboratories, Inc., Milwaukee, Wis.
Powder Weld Process Co., The, Brooklyn, N. Y.
Proved Products Mfg. Co., San Fernando, Calif.
Rochester Lead Works, Inc., Rochester, N. Y.
Rotometals, Inc., San Francisco, Calif.
Ruby Chemical Co., Columbus, O.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Soldering Specialties Co., Summit, N. J.
Special Chemicals Corp., New York, N. Y.
Standard Rolling Mills, Inc., Brooklyn, N. Y.
Sulflo, Inc., Elizabeth, N. J.
Turco Products, Inc., Los Angeles, Calif.
Utility Laboratory, Inc., Brooklyn, N. Y.
Wolfe-Kote Co., Inc., Sheboygan, Wis.

SOLENOIDS AND SOLENOID COILS

●Allen-Bradley Co., Milwaukee, Wis.
●Automatic Switch Co., Orange, N. J.
Barber-Colman Co., Rockford, Ill.
B/W Controller Corp., Birmingham, Mich.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Davis & Co., Dean W., Kentand, Ind.
Essex Wire Corp., Detroit, Mich.
●General Controls Co., Glendale, Calif.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Guardian Electric Mfg. Co., Chicago, Ill.
Hubbell Corp., Mundelein, Ill.
Jefferson Electric Co., Bellwood, Ill.
National Acme Co., The, Cleveland, O.
Soreng Mfg. Co., Schiller Park, Ill.
Synchro-Start Products, Inc., Chicago, Ill.
Trombetta Solenoid Corp., Milwaukee, Wis.

SOLENOID VALVES

See Valves, Solenoid

SOOT BLOWERS

See Blowers, Soot

SOOT DESTROYERS

See Destroyers, Soot, Chemical

SOUND DEADENING FOR DUCTS

See Insulation, Duct, Sound Deadening

SOUND INDICATORS

See Indicators, Sound Level

SPARGER NOZZLES

See Nozzles, Sparger, for Tank Heating

SPEED CHANGERS

See Changers, Speed, Hydraulic Coupling; Changers, Speed, Mechanical

SPEED REDUCERS

See Reducers, Speed

SPIRAL PIPE

See Pipe, Spiral, Riveted and Welded

SPOT WELDERS

See Welders, Spot

SPRAY HUMIDIFIERS

See Humidifiers, Direct, Spray Head

SPRAY NOZZLES

See Nozzles, Spray

SPRAY PAINTING BOOTHS

See Booths, Painting, Spray

SPRINKLER HEADS

See Heads, Sprinkler

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SPRINKLER SYSTEM CONTROLS

See Controls, Fire Protection Sprinkler System; Valves, Fire Protection Sprinkler System Control

STAINLESS STEEL PIPE

See Pipe, Steel, Stainless

STAINLESS STEEL SHEETS

See Sheets, Steel, Stainless

STANDS, PIPE VISE

American Pipe Tool Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Crown Die & Tool Co., Chicago, Ill.
Martin & Sons, H. P., Owensboro, Ky.
Nye Tool Co., Chicago, Ill.
Oster Mfg. Co., Cleveland, O.
●Ridge Tool Co., Elyria, O.
Western Wire Products Co., St. Louis, Mo.
Williams & Co., J. H., Buffalo, N. Y.

STAPLES FOR FASTENING TUBING

See Hangers and Supports, Pipe

STARTERS, MOTOR

See Controllers and Starters, Motor

STEAM BOOSTER COMPRESSORS

See Compressors, Steam Booster

STEAM ENGINES

See Engines, Steam

STEAM JET HEATERS

See Heaters, Steam Jet, for Liquids

STEAM JET REFRIGERATION

See Compressors, Refrigerating, Steam Jet

STEAM PRESSURE REGULATORS

See Valves, Pressure Reducing and Regulating

STEAM PUMPS

See Pumps, Steam

STEAM SEPARATORS

See Separators, Steam and Oil

STEAM TRAPS

See Traps, Steam

STEEL PIPE

See Pipe, Steel

STEEL TUBE FITTINGS, FLARED

See Fittings, Steel Tube, Flared

STEEL TUBING

See Tubing, Steel

STEEL UNIONS

See Unions, Steel

STEEL VALVES

See Valves, Gate; and Valves, Globe

STERILIZING LAMPS

See Lamps, Sterilizing, for Duct Installation

STERILIZING UNITS

See Units, Sterilizing, Air

STOCKS AND DIES

American Pipe Tool Co., Chicago, Ill.
Armstrong Mfg. Co., Bridgeport, Conn.
Beaver Pipe Tools, Inc., Warren, O.
Capewell Mfg. Co., Hartford, Conn.
Champion Blower & Forge Co., Lancaster, Pa.
Crown Die & Tool Co., Chicago, Ill. (Pipe)
Erie Tool Wks., Erie, Pa.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hollands Mfg. Co., Erie, Pa.
Nye Tool Co., Chicago, Ill.
Oster Mfg. Co., Cleveland, O.
●Ridge Tool Co., Elyria, O.
Threadwell Tap & Die Co., Greenfield, Mass.
Toledo Pipe Threading Machine Co., Toledo, O.

STOKERS, INDUSTRIAL AND COMMERCIAL

61 *to* 1200 *Lb per Hr*

Allington & Curtis Mfg. Co., Saginaw, Mich. (For shavings, chips and sawdust)
American Coal Burner Co., Chicago, Ill.
American Engineering Co., Philadelphia, Pa.
Auburn Burner Co., Auburn, Ind.
Auburn Foundry, Inc., Stoker Div., Auburn, Ind.
Automatic Firing Corp., St. Louis, Mo.
●Babcock & Wilcox Co., New York, N. Y.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Brownell Co., The, Dayton, O.
Canton Stoker Corp., Canton, O.
Carnes, Inc., John R., Lima, O.
Carpenter Heating & Stoker Co., Cleveland, O.
Central Rubber & Steel Corp., Findlay, O.
Clizbe Bros. Mfg. Co., Plymouth, Ind.
Combustion Engineering-Superheater, Inc., New York, N. Y.
Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.
●Detroit Stoker Co., Detroit, Mich.
Diamond Iron Works, Inc., Minneapolis, Minn.
Econocol Stoker Div. of Cotta Transmission Co., Rockford, Ill.
Eddy Stoker Corp., Chicago, Ill.
Erie City Iron Works, Erie, Pa.
Fairbanks, Morse & Co., Chicago, Ill.
Fire-King Stoker Co., Indianapolis, Ind.
Flynn & Emrich Co., Baltimore, Md.
Frederick Iron & Steel Inc., Frederick, Md.
Freeman Stoker Div., Illinois Iron & Bolt Co., Chicago, Ill.
Fuel Savers, Inc., Harrisburg, Pa.
General Machinery Co., Spokane, Wash.
Gross-Aire Mfg. Co., Overland, Mo.
Gunnite Foundries Corp., Rockford, Ill. (Screws)
Heating Assurance, Inc., Spokane, Wash.
Her-Born Engrg. & Mfg. Co., Sandusky, O.
Hershey Machine & Foundry Co., Motorstoker Div., Manheim, Pa.
Hoffman Combustion Engineering Co., Detroit, Mich.
Holcomb & Hoke Mfg. Co., Inc., Indianapolis, Ind.
International Engineering Wks., Inc., Framingham, Mass.
Iron Fireman Mfg. Co., Cleveland, O.
Johnston & Jennings Co., Cleveland, O.
Kingston Products Corp., Kokomo, Ind.
Kol-Master Corp., Oregon, Ill.
Laclede Stoker Co., St. Louis, Mo.
Leffel & Co., James, Springfield, O.
Loyal Knight Stokers, Inc., Belleville, Ill.
Mallory Sales Co., Dolton, Ill.
Meyer Furnace Co., The, Peoria, Ill.
Muncie Gear Wks., Inc., Muncie, Ind.
National Steam Pump Co., Upper Sandusky, O.
Newcomb-Detroit Co., Detroit, Mich.
Northern Steel & Stoker Corp., Peoria, Ill.
Ormsby-Osterman, Inc., St. Louis, Mo.
OverSpred Stoker Co., Chicago, Ill.
Perfection Grate & Stoker Co., Springfield, Mass.
Plymouth Industries, Inc., Plymouth, Ind.
Rheem Mfg. Co., New York, N. Y.
Riley Stoker Corp., Worcester, Mass.
Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Scott-Newcomb, Inc., St. Louis, Mo.
Sinker-Davis Co., Indianapolis, Ind.
Standard Stoker Co., Inc., Erie, Pa.
Steel Products Engineering Co., Springfield, O.
Stokol Stoker Co., Inc., Dayton, O.
Sun-Fire Stoker Corp., New Albany, Ind.
Timken Silent Automatic Div., Timken-Detroit Axle Co., Jackson, Mich.
U. S. Machine Corp., Lebanon, Ind.
V. & E. Products, Inc., Schuylkill Haven, Pa.
Whiting Fire Power Products Corp., Superior, Wis.
Whitty Co., Inc., Boston, Mass. (Bituminous)
Will-Burt Co., The, Orrville, O.

STONEWARE PIPE

See Pipe, Stoneware

STORAGE WATER HEATERS

See Heaters, Water, Steam, Storage

STRAINERS, PIPE LINE

Air Maze Corp., Cleveland, O.
●Alco Valve Co., St. Louis, Mo.
Altens Foundry & Machine Works, Inc., Lancaster, O.
●American District Steam Co., North Tonawanda, N. Y.
Aminco Refrigeration Products Co., Detroit, Mich.
Andale Co., Philadelphia, Pa.
●Anderson Co., V. D., The, Cleveland, O.
●Armstrong Machine Wks., Three Rivers, Mich.
●Barnes & Jones, Inc., Boston, Mass. (steam and water only)
Barrett, Haentjens & Co., Hazleton, Pa.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Blackmer Pump Co., Grand Rapids, Mich.
Bowser, Inc., Fort Wayne, Ind.
Boylston Steam Specialty Co., Chicago, Ill.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.

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Cashin Co., W. D., Boston, Mass.
Clark Mfg. Co., Cleveland, O.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Cuno Engineering Corp., Meriden, Conn.
Davis Regulator Co., Chicago, Ill.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Edward Valves, Inc., East Chicago, Ind.
Elliott Co., Jeannette, Pa.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Newark, N. J.
Foster Pump Works, Inc., Union, N. Y.
●General Controls Co., Glendale, Calif.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
Hays Mfg. Co., Erie, Pa.
●Henry Valve Co., Melrose Park, Ill.
●Hoffman Specialty Co., Indianapolis, Ind.
Hubbell Corp., Mundelein, Ill.
●Illinois Engineering Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
Kieley & Mueller, Inc., North Bergen, N. J.
Kinney Mfg. Co., Boston, Mass.
Kraissl Co., Inc., The, Hackensack, N. J.
Lancaster Heat Transfer Co., Inc., Brooklyn, N. Y.
●Leslie Co., Lyndhurst, N. J.
Madden Brass Products Co., The, Chicago, Ill.
●Maid-O'-Mist, Inc., Chicago, Ill.
●Marsh Corp., Jas. P., Skokie, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Monarch Mfg. Wks., Inc., Philadelphia, Pa.
●Mueller Brass Co., Port Huron, Mich.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Long Island City, N. Y.
Newark Wire Cloth Co., Newark, N. J.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
OPW Corp., Cincinnati, O.
Phillips & Co., H. A., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Scientific Instrument Co., Detroit, Mich.
Sheffler-Gross Co., Philadelphia, Pa.
●Spence Engineering Co., Inc., Walden, N. Y.
Spray Engineering Co., Somerville, Mass.
●Spraying Systems Co., Bellwood, Ill.
Standard Machine & Mfg. Co., St. Louis, Mo.
Staples & Pfeiffer, San Francisco, Calif.
●Sterling, Inc., Milwaukee, Wis.
Strong, Carlisle & Hammond Co., Cleveland, O.
●Swartwout Co., Cleveland, O.
●Trane Co., The, LaCrosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Trimount Rotary Power Co., Dedham, Mass.
Tryco Products, Inc., Westfield, Mass.
●Walworth Co., New York, N. Y.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
●Webster & Co., Warren, Camden, N. J.
Webster Electric Co., Racine, Wis. (For oil burners)
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.
Winslow Engineering Co., Oakland, Calif.
Wright-Austin Co., Detroit, Mich.
●Yarnall-Waring Co., Philadelphia, Pa.
Zurn Mfg. Co., J. A., Industrial Div., Erie, Pa.

STRESS RELIEVERS

See Preheaters and Stress Relievers, Electric, for Pipe Welds

STRIP HEATERS

See Heaters, Strip and Immersion, Electric

STRUCTURAL SHAPES

See Angles, Bars, Beams, Channels and Tees

STUD WELDERS

See Welders, Stud

SUCTION LINE HEAT EXCHANGERS

See Exchangers, Heat, Refrigerant Suction Line

SUMP PUMPS

See Pumps, Sump

SUPERHEATERS, PROCESS STEAM

●Babcock & Wilcox Co., New York, N. Y.
●Bell & Gossett Co., Morton Grove, Ill.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Combustion Engineering-Superheater, Inc., New York, N. Y.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Edge Moor Iron Works, Inc., Edge Moor, Del.
Ewing Mfg. Co., Oklahoma City, Okla.
Foster Wheeler Corp., New York, N. Y.
Goodyer Industries, Inc., Chicago, Ill.
Selas Corp. of America, Philadelphia, Pa.
Springfield Boiler Co., Springfield, Ill.

SURFACE, FINNED, COOLING, BRINE

●Acme Industries, Inc., Jackson, Mich.
●Aerofin Corp., Syracuse, N. Y.
●American Blower Corp., Detroit, Mich.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Brown Fintube Co., The, Elyria, O.
●Bush Mfg. Co., West Hartford, Conn.
Conditionaire Unit Co., Chicago, Ill.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Drayer & Hanson, Inc., Los Angeles, Calif.
●G. & O. Mfg. Co., New Haven, Conn.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Griscom-Russell Co., The, New York, N. Y.
Howe Ice Machine Co., Chicago, Ill.
Industrial Mfg. & Engineering Co., Chicago, Ill.
●Kennard Corp., St. Louis, Mo.
●Kramer Trenton Co., Trenton, N. J.
●Marlo Coil Co., St. Louis, Mo.
●McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.
Murray Mfg. Co., D. J., Wausau, Wis.
●Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
●Rempe Co., Chicago, Ill.
Rigidbilt Inc., Chicago, Ill.
Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
●Super Radiator Corp., Minneapolis, Minn.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, LaCrosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
Vilter Mfg. Co., Milwaukee, Wis.
●Wolverine Tube Div. Calumet and Hecla Consolidated Copper Co., Detroit, Mich.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

SURFACE, FINNED, COOLING, COLD WATER

●Acme Industries, Inc., Jackson, Mich.
●Aerofin Corp., Syracuse, N. Y.
●American Blower Corp., Detroit, Mich.
American Coils Co., Newark, N. J.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Brown Fintube Co., The, Elyria, O.
●Bush Mfg. Co., West Hartford, Conn.
Chicago Fan & Fin Coil Co., Chicago, Ill.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Conditionaire Unit Co., Chicago, Ill.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Drayer & Hanson, Inc., Los Angeles, Calif.
Frigidaire Div., General Motors Corp., Dayton, O.
●G. & O. Mfg. Co., New Haven, Conn.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
●Governair Corp., Oklahoma City, Okla.
Griscom-Russell Co., The, New York, N. Y.
Howe Ice Machine Co., Chicago, Ill.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
●Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Inc., Atlanta, Ga.
●Marlo Coil Co., St. Louis, Mo.
●McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.
●Modine Mfg. Co., Racine, Wis.
Murray Mfg. Co., D. J., Wausau, Wis.
●Nesbitt, Inc., John J., Philadelphia, Pa.
●Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Pleasantaire Corp., Washington, D. C.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
●Rempe Co., Chicago, Ill.
Rigidbilt Inc., Chicago, Ill.
Rittling Corp., The, Hamburg, N. Y.
Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
●Super Radiator Corp., Minneapolis, Minn.

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Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, LaCrosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
●United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Wing Mfg. Co., L. J., Linden, N. J.
●Wolverine Tube Div., Calumet & Hecla Consolidated Copper Co., Detroit, Mich.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
Yates-American Machine Co., Beloit, Wis.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

SURFACE, FINNED, COOLING, DIRECT EXPANSION

●Acme Industries, Inc., Jackson, Mich.
●Aerofin Corp., Syracuse, N. Y.
●American Blower Corp., Detroit, Mich.
American Coils Co., Newark, N. J.
Betz Corp., Hammond, Ind.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Brown Fintube Co., The, Elyria, O.
●Bush Mfg. Co., West Hartford, Conn.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Conditionaire Unit Co., Chicago, Ill.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Drayer & Hanson, Inc., Los Angeles, Calif.
Frigidaire Div., General Motors Corp., Dayton, O.
●G. & O. Mfg. Co., New Haven, Conn.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
●Governair Corp., Oklahoma City, Okla.
Griscom-Russell Co., The, New York, N. Y.
Heat-X-Changer Co., Inc., The, New York, N. Y.
Howe Ice Machine Co., Chicago, Ill.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
●Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Inc., Atlanta, Ga.
●Marlo Coil Co., St. Louis, Mo.
●McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.
Merchant & Evans Co., Philadelphia, Pa.
●Modine Mfg. Co., Racine, Wis.
Murray Mfg. Co., D. J., Wausau, Wis.
●Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Pleasantaire Corp., Washington, D. C.
Refrigeration Appliances Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
●Rempe Co., Chicago, Ill.
Rigidbilt Inc., Chicago, Ill.
Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
●Super Radiator Corp., Minneapolis, Minn.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, LaCrosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
●United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Wolverine Tube Div., Calumet and Hecla Consolidated Copper Co., Detroit, Mich.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
Yates-American Machine Co., Beloit, Wis.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

SURFACE, FINNED, HEATING, INDIRECT, FERROUS

Bayley Blower Co., Milwaukee, Wis.
Brown Fintube Co., The, Elyria, O.
●Bush Mfg. Co., West Hartford, Conn.
Conditionaire Unit Co., Chicago, Ill.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
●Drayer & Hanson, Inc., Los Angeles, Calif.
●G. & O. Mfg. Co., New Haven, Conn.
Goodyer Industries, Inc., Chicago, Ill.
Griscom-Russell Co., The, New York, N. Y.
Industrial Mfg. & Engineering Co., Chicago, Ill.
●Modine Mfg. Co., Racine, Wis.
Murray Mfg. Co., D. J., Wausau, Wis.
National Radiator Co., The, Johnstown, Pa.
●New York Blower Co., Chicago, Ill.
●Niagara Blower Co., New York, N. Y.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Rigidbilt Inc., Chicago, Ill.
Rittling Corp., The, Hamburg, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, LaCrosse, Wis.
●Vulcan Radiator Co., Hartford, Conn.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

SURFACE, FINNED, HEATING, INDIRECT, NON-FERROUS

●Aerofin Corp., Syracuse, N. Y.
●American Blower Corp., Detroit, Mich.
American Coils Co., Newark, N. J.
Bayley Blower Co., Milwaukee, Wis.
Bohn Aluminum & Brass Corp., Detroit, Mich.
Brown Fintube Co., The, Elyria, O.
●Bush Mfg. Co., West Hartford, Conn.
Chicago Fan & Fin Coil Co., Chicago, Ill.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Drayer & Hanson, Inc., Los Angeles, Calif.
Frigidaire Div., General Motors Corp., Dayton, O.
●G. & O. Mfg. Co., New Haven, Conn.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Goodyer Industries, Inc., Chicago, Ill.
●Governair Corp., Oklahoma City, Okla.
Griscom-Russell Co., The, New York, N. Y.
Heat-X-Changer Co., Inc., The, New York, N. Y.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
●Kramer Trenton Co., Trenton, N. J.
Larkin Coils, Inc., Atlanta, Ga.
●Marlo Coil Co., St. Louis, Mo.
●McCord Corp., Detroit, Mich.
McQuay, Inc., Minneapolis, Minn.
●Modine Mfg. Co., Racine, Wis.
Murray Mfg. Co., D. J., Wausau, Wis.
●Nesbitt, Inc., John J., Philadelphia, Pa.
●Niagara Blower Co., New York, N. Y.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
●Rempe Co., Chicago, Ill.
Rigidbilt Inc., Chicago, Ill.
Rittling Corp., The, Hamburg, N. Y.
Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
●Super Radiator Corp., Minneapolis, Minn.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, LaCrosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
●United States Air Conditioning Corp., Minneapolis, Minn.
●Vulcan Radiator Co., Hartford, Conn.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Wing Mfg. Co., L. J., Linden, N. J.
●Wolverine Tube Div., Calumet and Hecla Consolidated Copper Co., Detroit, Mich.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

SURFACE THERMOSTATS

See Thermostats, Surface

SWING JOINTS

See Joints, Pipe, Flexible Swing and Revolving

SWITCHES, ELECTRICAL

Acro Mfg. Co., The, Columbus, O.
Adam Electric Co., Frank, St. Louis, Mo.
Aerotec Corp., The, Greenwich, Conn.
●Allen-Bradley Co., Milwaukee, Wis.
●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Arrow-Hart & Hegeman Elect. Co., Hartford, Conn.
●Automatic Switch Co., Orange, N. J.
Barber-Colman Co., Rockford, Ill.
Clark Controller Co., Cleveland, O.
Congress Fan & Electric Co., Daytona Beach, Fla.
Cooper Co., Clark, Palmyra, N. J.
Crise Mfg. Co., The, Columbus, O.
Cutler-Hammer, Inc., Milwaukee, Wis.
Defender Instrument & Regulator Co., St. Louis, Mo.
Delta-Star Electric Co., Chicago, Ill.
Electric Controller & Mfg. Co., Cleveland, O.
Electric Machinery Mfg. Co., Minneapolis, Minn.
Electro-Switch & Controls, Inc., Culver City, Calif.
Furnas Electric Co., Batavia, Ill.
●General Controls Co., Glendale, Calif.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Guardian Electric Mfg. Co., Chicago, Ill.
Hart Mfg. Co., Hartford, Conn.
●McDonnell & Miller, Inc., Chicago, Ill.
●Mercoid Corp., Chicago, Ill.
Micro Switch Div. of Minneapolis-Honeywell Regulator Co., Freeport, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Monitor Controller Co., The, Boston, Mass.
Morse-Smith-Morse, Inc., Watertown, Mass.
National Acme Co., The, Cleveland, O.
●Penn Electric Switch Co., Goshen, Ind.

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Soreng Mfg. Co., Schiller Park, Ill.
Square D Co., Detroit, Mich.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Struthers-Dunn, Inc., Philadelphia, Pa.
Thermix Corp., The, Greenwich, Conn.
Tork Clock Co., Inc., Mount Vernon, N. Y.
Trumbull Electric Mfg. Co., The, Plainville, Conn.
Unimax Switch Div., W. L. Maxson Corp., New York, N. Y.
Walton Co., Hartford, Conn. (Foot)
●Ward Leonard Electric Co., Mount Vernon, N. Y.
Westinghouse Electric Corp., Pittsburgh, Pa.
White Mfg. Co., St. Paul, Minn.
White-Rodgers Electric Co., St. Louis, Mo.
Zenith Electric Co., Chicago, Ill.

SWITCHES, FLOAT, REFRIGERATION

●Alco Valve Co., St. Louis, Mo.
Arrow-Hart & Hegeman Elect. Co., Hartford, Conn.
Clark Controller Co., Cleveland, O.
●Frick Co., Waynesboro, Pa.
Magnetrol, Inc., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
●Mercoid Corp., The, Chicago, Ill.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Thermix Corp., The, Greenwich, Conn.

SWITCHES, FLOW

Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Coral Designs, Long Island City, N. Y.
Drying Systems, Inc., Chicago, Ill.
Fischer & Porter Co., Hatboro, Pa.
●General Controls Co., Glendale, Calif.
Magnetrol, Inc., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
●Penn Electric Switch Co., Goshen, Ind.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
Thermix Corp., The, Greenwich, Conn.

SWITCHES, LIQUID LEVEL

●Alco Valve Co., St. Louis, Mo.
●Allen-Bradley Co., Milwaukee, Wis.
Arrow-Hart & Hegeman Elect. Co., Hartford, Conn.
Automatic Control Co., St. Paul, Minn.
B/W Controller Corp., Birmingham, Mich.
Bennett Oil Co., Omaha, Neb.
Cissell Mfg. Co., Inc., W. M., Louisville, Ky.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Coral Designs, Long Island City, N. Y.
Cutler-Hammer, Inc., Milwaukee, Wis.
Defender Instrument & Regulator Co., St. Louis, Mo.
Detroit Lubricator Co., Detroit, Mich.
Fischer & Porter Co., Hatboro, Pa.
Furnas Electric Co., Batavia, Ill.
●General Controls Co., Glendale, Calif.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Healy Ruff Co., St. Paul, Minn.
Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
Kisco Boiler & Engineering Co., St. Louis, Mo.
Liquidepth Indicators, Inc., Long Island City, N. Y.
Magnetrol Inc., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
●Mercoid Corp., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Monitor Controller Co., The, Boston, Mass.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
●Penn Electric Switch Co., Goshen, Ind.
Photoswitch, Inc., Cambridge, Mass.
Ripley Co., Inc., Middletown, Conn.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Schaub Engineering Co., Fred H., Chicago, Ill.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
●Stephens-Adamson Mfg. Co., Aurora, Ill.
Thermix Corp., The, Greenwich, Conn.
Westinghouse Electric Corp., Pittsburgh, Pa.

SWITCHES, MERCURY

Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Durakool, Inc., Elkhart, Ind.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
●Mercoid Corp., Chicago, Ill.
Mercontrol Inc., New York, N. Y.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
Norwalk Valve Co., South Norwalk, Conn.
Potter & Brumfield Sales Co., Princeton, Ind.
Westinghouse Electric Corp., Pittsburgh, Pa.

SWITCHES, PRESSURE AND VACUUM

Aerotec Corp., The, Greenwich, Conn.
●Allen-Bradley Co., Milwaukee, Wis.
Autempco Corp., New York, N. Y.
Automatic Control Co., St. Paul, Minn.
Barber-Colman Co., Rockford, Ill.
Barksdale Valves, Los Angeles, Calif.
Clark Controller Co., Cleveland, O.
Cook Electric Co., Chicago, Ill.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Defender Instrument & Regulator Co., St. Louis, Mo.
Detroit Lubricator Co., Detroit, Mich.
Furnas Electric Co., Batavia, Ill.
●General Controls Corp., Glendale, Calif.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Giannini & Co., Inc., G. M., Pasadena, Calif.
Gleason-Avery, Inc., Auburn, N. Y.
H-B Instrument Co., Philadelphia, Pa.
Healy Ruff Co., St. Paul, Minn.
Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
McQuay-Norris Mfg. Co., St. Louis, Mo.
Meletron Corp., Los Angeles, Calif.
●Mercoid Corp., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Monitor Controller Co., The, Boston, Mass.
Newark Boiler Regulator Co., Inc., Bloomfield, N. J.
Pantex Mfg. Corp., Hydraulics Div., Pawtucket, R. I.
●Penn Electric Switch Co., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
Ranco, Inc., Columbus, O.
Rochester Mfg. Co., Inc., Rochester, N. Y.
Sampsel Time Control, Inc., Spring Valley, Ill.
Shallcross Controls, Inc., Milwaukee, Wis.
Skaneateles Mfg. Co., Inc., Syracuse, N. Y.
Soreng Mfg. Co., Schiller Park, Ill.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Thermix Corp., The, Greenwich, Conn.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
Westinghouse Electric Corp., Pittsburgh, Pa.
●White-Rodgers Electric Co., St. Louis, Mo.

SWITCHES, TIME

●Allen-Bradley Co., Milwaukee, Wis.
American Gas Accumulator Co., Elizabeth, N. J.
Autempco Corp., New York, N. Y.
Automatic Devices Co., Inc., Chicago, Ill.
Automatic Electric Mfg. Co., Mankato, Minn.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Barber-Colman Co., Rockford, Ill.
Cooper Co., Clark, Palmyra, N. J.
Durakool, Inc., Elkhart, Ind.
Edison, Inc., Thomas A., Instrument Div., West Orange, N. J.
Electric Switch & Controls, Inc., Culver City, Calif.
●General Controls Corp., Glendale, Calif.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Gleason-Avery, Inc., Auburn, N. Y.
Hansen Mfg. Co., Princeton, Ind. (timing motors and time machine)
Haydon Mfg. Co., Inc., Sub. General Time Instruments Corp., Torrington, Conn.
Healy Ruff Co., St. Paul, Minn.
Heat Timer Corp., New York, N. Y.
Holcomb & Hoke Mfg. Co., Inc., Indianapolis, Ind.
Industrial Engineering Corp., Terre Haute, Ind.
International Register Co., Chicago, Ill.
Landis & Gyr, Inc., New York, N. Y.
●Mercoid Corp., Chicago, Ill.
Miller-Harris Instrument Co., Milwaukee, Wis.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
National Time & Signal Corp., Detroit, Mich.
Paragon Electric Co., Two Rivers, Wis.
●Penn Electric Switch Co., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
Photoswitch, Inc., Cambridge, Mass.
Potter & Brumfield Sales Co., Princeton, Ind.
Precision Products, Inc., Tulsa, Okla.
Reliance Automatic Lighting Co., Racine, Wis.
Reynolds Electric Co., River Grove, Ill.
Rhodes, Inc., M. H., Hartford, Conn.
Ripley Co., Inc., L-R Blower Div., Middletown, Conn.
Sampsel Time Control, Inc., Spring Valley, Ill.
Sangamo Electric Co., Springfield, Ill.
Telechron, Inc., Ashland, Mass.
Tork Clock Co., Inc., Mount Vernon, N. Y.
●Ward Leonard Electric Co., Mount Vernon, N. Y.
Westinghouse Electric Corp., Pittsburgh, Pa.
●White-Rodgers Electric Co., St. Louis, Mo.
Zenith Electric Co., Chicago, Ill.

SWIVEL PIPE COUPLINGS

See Joints, Pipe, Flexible Swing and Revolving

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SYSTEMS, COMBUSTION CONTROL

Askania Regulator Co., Chicago, Ill.
●Aurora Pump Co., Aurora, Ill.
Bailey Meter Co., Cleveland, O.
Bowser, Inc., Fort Wayne, Ind.
Bristol Co., Waterbury, Conn.
Brooke Engineering Co., Inc., Philadelphia, Pa.
●Cash Co., A. W., Decatur, Ill.
●Combustion Control Corp., Cambridge, Mass.
Defender Instrument & Regulator Co., St. Louis, Mo.
De-Tec-Tronic Laboratories, Inc., Chicago, Ill.
Engineer Co., New York, N. Y.
Ess Instrument Co., Bergenfield, N. J.
Fischer & Porter Co., Hatboro, Pa.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
General Power Plant Corp., New York, N. Y.
Hagan Corp., Pittsburgh, Pa.
●Hays Corp., Michigan City, Ind.
●Illinois Engineering Co., Chicago, Ill.
Leahy Mfg. Co., Los Angeles, Calif.
●Mercoid Corp., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
●Perfex Corp., Milwaukee, Wis.
Republic Flow Meters Co., Chicago, Ill.
Selas Corp. of America, Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.

SYSTEMS, CONDENSATE RETURN

Acker Organization, Inc., W. M., Cleveland, O.
●Aurora Pump Co., Aurora, Ill.
●Barnes & Jones, Inc., Boston, Mass.
Cissell Mfg. Co., Inc., W. M., Louisville, Ky.
●Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Jacuzzi Bros., Inc., Richmond, Calif.
●Orr & Sembower, Inc., Reading, Pa.
Roth Co., Roy E., Rock Island, Ill.
Sterling Engineering & Mfg. Corp., Hyde Park, Mass.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
Templeton Bros., Hyde Park, Mass.

SYSTEMS, ELECTRIC PIPE HEATING

Fluid Systems, Inc., New Haven, Conn.
Industrial Engineering & Equipment Co., St. Louis, Mo.
●Wiegand Co., Edwin L., Pittsburgh, Pa.

SYSTEMS, FIRE EXTINGUISHING, CARBON DIOXIDE, AND HEAT AND SMOKE DETECTORS

●C-O-Two Fire Equipment Co., Newark, N. J.
Cardox Corp., Chicago, Ill.

SYSTEMS, HEATING, HIGH TEMPERATURE HOT WATER

Over 350 *F*

Ross Engineering Corp., J. O., New York, N. Y.

SYSTEMS, HEATING, HOT WATER

●Bell & Gossett Co., Morton Grove, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
General Heaters & Regulators Co., Chicago, Ill.
Gold Top Heating, Inc., Butte, Mont.
●Hoffman Specialty Co., Indianapolis, Ind.
Hook & Ackerman, Inc., New York, N. Y.
Kainer & Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
Preferred Utilities Mfg. Corp., New York, N. Y.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Surface Combustion Corp., Toledo, O.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A. Peru, Ind.
●Trane Co., The, La Crosse, Wis.
Triplex Heating Speciality Co., Inc., Peru, Ind.
●Webster & Co., Warren, Camden, N. J.

SYSTEMS, HEATING, VACUUM

Anderson Products, Inc., Cambridge, Mass.
●Barnes & Jones, Inc., Boston, Mass.
Cashin Co., W. D., Boston, Mass.
●Dunham Co., C. A., Chicago, Ill.
●Hoffman Specialty Co., Indianapolis, Ind.
●Illinois Engineering Co., Chicago, Ill.
●Marsh Corp., Jas. P., Skokie, Ill.
Monash-Younker Co., Inc., Chicago, Ill.
Mouat Vapor Heating Co., The, Cleveland, O.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
●Trane Co., The, La Crosse, Wis.
●Webster & Co., Warren, Camden, N. J.
Whittington Pump & Engineering Corp., Indianapolis, Ind.

SYSTEMS, HEATING, VAPOR

●American District Steam Co., North Tonawanda, N. Y.
●Barnes & Jones, Inc., Boston, Mass.
Cashin Co., W. D., Boston, Mass.
●Dunham Co., C. A., Chicago, Ill.
Gorton Heating Corp., Cranford, N. J.
●Hoffman Specialty Co., Indianapolis, Ind.
●Illinois Engineering Co., Chicago, Ill.
●Marsh Corp., Jas. P., Skokie, Ill.
Monash-Younker Co., Inc., Chicago, Ill.
Mouat Vapor Heating Co., The, Cleveland, O.
Radiator Valve Co. of America, Philadelphia, Pa.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
●Trane Co., The, La Crosse, Wis.
Vapor Specialty Co., New York, N. Y.
●Webster & Co., Warren, Camden, N. J.

SYSTEMS, HEATING, ZONE CONTROL

Autempco Corp., New York, N. Y.
Automatic Devices Co., Inc., Chicago, Ill.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Barber-Colman Co., Rockford, Ill.
●Barnes & Jones, Inc., Boston, Mass.
●Bell & Gossett Co., Morton Grove, Ill.
●Dunham Co., C. A., Chicago, Ill.
General Heaters & Regulators Co., Chicago, Ill.
Gold Top Heating, Inc., Butte, Mont.
Heat Timer Corp., New York, N. Y.
●Hoffman Specialty Co., Indianapolis, Ind.
●Illinois Engineering Co., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
●Mercoid Corp., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, La Crosse, Wis.
●Webster & Co., Warren, Camden, N. J.
Wheelco Instruments Co., Chicago, Ill.
Zone-Heat Regulator Co., Garrettsville, O.

SYSTEMS, HOT GAS DEFROSTING, FOR REFRIGERATION

●Kramer Trenton Co., Trenton, N. J.
●Patterson-Kelly Co., Inc., The, East Stroudsburg, Pa.
●Penn Electric Switch Co., Goshen, Ind.
Tenney Engineering, Inc., Newark, N. J.

SYSTEMS, PROCESS HEATING, HIGH TEMPERATURE

●Air Devices, Inc., New York, N. Y.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Dow Chemical Co., The, Midland, Mich.
●Dravo Corp., Pittsburgh, Pa.
Drying Systems, Inc., Chicago, Ill.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Goodyer Industries, Inc., Chicago, Ill.
●Illinois Engineering Co., Chicago, Ill.
Mitchell & Co., Inc., W. K., Philadelphia, Pa.
●Olson & Co., Arthur A., Canfield, O.
Parks-Cramer Co., Fitchburg, Mass.
Peabody Engineering Corp., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Selas Corp. of America, Philadelphia, Pa.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
●Trane Co., The, La Crosse, Wis.
Trent, Inc., Philadelphia, Pa.
●Wing Mfg. Co., L. J., Linden, N. J.

SYSTEMS, ROOF SPRAYING (FOR COOLING ROOFS)

●April Showers Co., Inc., Washington, D. C.
●Binks Mfg. Co., Chicago, Ill.
Goettl Bros. Metal Prod., Inc., Phoenix, Ariz.
●Marley Co., Inc., The, Kansas City, Kan.
Rockwood Spinkler Co., Worcester, Mass.
Ross Sprinkler Co., Pasadena, Calif.
●Ruppright, Siegfried, Los Angeles, Calif.
Skinner Irrigation Co., Troy, O.
Spray Engineering Co., Somerville, Mass.
●Spraying Systems Co, Bellwood, Ill.
Thermal Industries, Indio, Calif.
Water Cooling Corp., New York, N. Y.

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TAGS, VALVE, FOR IDENTIFYING VALVES

Meyer & Wenthe, Inc., Chicago, Ill.

TANK HEADS

See Parts, for Heating and Air Conditioning Equipment

TANKS, EXPANSION, FOR HOT WATER HEATING SYSTEMS

●Bell & Gossett Co., Morton Grove, Ill.
Biggs Boiler Works Co., E. Akron, O.
Birchfield Boiler, Inc., Tacoma, Wash.
Buffalo Tank Corp., Newark, N. J.
Caldwell Co., W. E., Louisville, Ky.
Case & Son Mfg. Co., W. A., Buffalo, N. Y.
Cincinnati Metalcrafts Inc., Cincinnati, O.
●General Automatic Products Corp., Baltimore, Md.
Kehm Corp., The, Chicago, Ill.
Koven & Bro., Inc., L. O., Jersey City, N. J.
Maysteel Products, Inc., Milwaukee, Wis.
Quaker City Iron Wks., Philadelphia, Pa.
Rheem Mfg. Co., New York, N. Y.
Scaife Co., Oakmont, Pa.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Western Blower Co., Seattle, Wash.
Wood Co., John, Conshohocken, Pa.
Wright-Austin Co., Detroit, Mich.

TANKS, PROCESS AND STORAGE

Aeroil Products Co., Inc., South Hackensack, N. J.
Alert Boiler & Mfg. Co., Detroit, Mich.
Aluminum Co. of America, Pittsburgh, Pa.
American Car & Foundry Co., New York, N. Y.
American Hard Rubber Co., New York, N. Y. (Rubber lined)
American Pipe & Steel Corp., Alhambra, Calif.
American Shipbuilding Co., Cleveland, O.
Armco Drainage & Metal Products, Inc., Middletown, O.
●Bell & Gossett Co., Morton Grove, Ill.
Bigelow Co., New Haven, Conn.
Biggs Boiler Wks. Co., E. Akron, O.
Birchfield Boiler, Inc., Tacoma, Wash.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Bros Boiler & Mfg. Co., Wm., Minneapolis, Minn.
Buffalo Tank Corp., Newark, N. J.
Caldwell Co., W. E., Louisville, Ky.
Case & Son Mfg. Co., W. A., Buffalo, N. Y.
Chicago Bridge & Iron Co., Chicago, Ill.
Chicago Steel Tank Co., Chicago, Ill.
Cincinnati Metalcrafts Inc., Cincinnati, O.
Columbian Steel Tank Co., Kansas City, Mo.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Connery Construction Co., Philadelphia, Pa.
Dahlquist Mfg. Co., Div. of Process Engineering Inc., Somerville, Mass.
Day Co., The, Minneapolis, Minn.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., Pittsburgh, Pa.
Dillon Steam Boiler Wks., Inc., D. M., Fitchburg, Mass.
Downingtown Iron Works, Downingtown, Pa.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Elastic Porcelain Lining Corp., Rochester, N. Y. (Tank linings)
Falstrom Co., Passaic, N. J.
Farrar & Trefts, Buffalo, N. Y.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
●Frick Co., Waynesboro, Pa.
Gehri Co., Tacoma, Wash.
General Ceramics & Steatite Corp., Keasbey, N. J. (chemical stoneware & porcelain)
Gerstein & Cooper, Inc., South Boston, Mass.
Goettl Bros. Metal Prod., Inc., Phoenix, Ariz.
Goodrich Co., B. F., Akron, O. (Rubber lined)
Graver Tank & Mfg. Co., Inc., East Chicago, Ind.
Haveg Corp., Newark, Del.
Heat Transfer Products, Inc., Carbondale, Pa.
Heilman Boiler Wks., Inc., Allentown, Pa.
Hodge Boiler Works, East Boston, Mass.
Illinois Oil Products, Inc., Rock Island, Ill.
International Boiler Wks., The, East Stroudsburg, Pa.
Kirk & Blum Mfg. Co., Cincinnati, O.
Knight, Maurice A., Akron, O.
Kopperman & Sons, Joseph, Philadelphia, Pa.
Koven & Bro., Inc., L. O., Jersey City, N. J.
Lead Lined Iron Pipe Co., Wakefield, Mass.
Littleford Bros. Inc., Cincinnati, O.
Lumm Co., A. H., Toledo, O.
Manitowoc Engineering Wks., Manitowoc, Wis.
Maysteel Products, Inc., Milwaukee, Wis.
Mesker Steel Corp., Geo. L., Evansville, Ind.
Murray Iron Wks. Co., Burlington, Ia.
National Metal Fabricators, Chicago, Ill.
Newcomb-Detroit Co., Detroit, Mich.
Nooter Corp., St. Louis, Mo.
●Patterson-Kelley Co., Inc., The, East Stroudsburg, Pa.
Pittsburgh Plate Glass Co., Pittsburgh, Pa. (glass)
Quaker City Iron Wks., Philadelphia, Pa.
Reco Products Div., Refrigeration Engineering Corp., Philadelphia, Pa.
Richmond Engineering Co., Inc., Richmond, Va.
Roessing Mfg. Co., Pittsburgh, Pa.
Rosebraugh Co., W. W., Salem, Ore.
Roth Co., Roy E., Rock Island, Ill.
Santa Fe Tank & Tower Co., Los Angeles, Calif.
Scaife Co., Oakmont, Pa.
Sims Co., Erie, Pa.
Southbridge Roofing Co., Inc., Southbridge, Mass.
●Struthers Wells Corp., Titusville, Pa.
●Terre Haute Boiler Works Co., Terre Haute, Ind.
Tippett & Wood, Phillipsburg, N. J.
Trageser Copper Wks., Inc., Maspeth, Long Island, N. Y.
United States Rubber Co., New York, N. Y.
United States Stoneware Co., New York, N. Y.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Vesco Corp., New York, N. Y.
Walsh-Holyoke Steam Boiler Co., Holyoke, Mass.
Western Blower Co., Seattle, Wash.
Whitlock Mfg. Co., Hartford, Conn.
Wood Co., John, Conshohocken, Pa.

TAPE, INDUSTRIAL, ADHESIVE

Gilmer Co., L. H., Div. of United States Rubber Co., Philadelphia, Pa.
Irvington Varnish & Insulator Co., Irvington, N. J.
Minnesota Mining & Mfg. Co., St. Paul, Minn.
Johns-Manville, New York, N. Y.
Polyken Industrial Tape Dept., Baur & Black, Div. of the Kendall Co., Chicago, Ill.
Seamless Rubber Co., Industrial Tape Div., New Haven, Conn.
United States Rubber Co., New York, N. Y.

TEMPERATURE AND HUMIDITY CONTROLS

See Humidistats; Recorder-Controllers; Thermostats

TEMPERATURE RECORDERS

See Recorders, Temperature

TEMPERATURE REGULATORS

See Regulators, Temperature

TEMPLATES, DRAWING, PIPING

Dietzgen Co., Eugene, Chicago, Ill.

TEST CHAMBERS

See Chambers, Test, Controlled Temperature and Humidity

TESTERS, GAGE, DEAD WEIGHT

Ashton Valve Co., Cambridge, Mass.
Crosby Steam Gage & Valve Co., Wrentham, Mass.
Dillon Co., Inc., W. C., Forest Park, Ill.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Mansfield & Green, Cleveland, O.

TESTERS, LEAK, FOR PIPING AND VESSELS

Greer Hydraulics, Inc., Brooklyn, N. Y.

THERMOMETERS, INDICATING, INDUSTRIAL

Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Dillon Co., Inc., W. C., Forest Park, Ill.
Electric Auto-Lite Co., Instrument & Gauge Div., Toledo, O.
Equipoise Controls, Mount Vernon, N. Y.
Foxboro Co., Foxboro, Mass.
G. M. Mfg. Co., New York, N. Y.
Garden City Instruments, Inc., Chicago, Ill.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
H-B Instrument Co., Philadelphia, Pa.
Hill, E. Vernon & Co., Chicago, Ill.
●Illinois Testing Laboratories, Inc., Chicago, Ill.
Instrument Associates, Inc., Brooklyn, N. Y.
●Johnson Service Co., Milwaukee, Wis.
Leeds & Northrup Co., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
●Marsh Corp., Jas. P., Skokie, Ill.
Marshalltown Mfg. Co., Marshalltown, Ia.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
Palmer Thermometers, Inc., Cincinnati (Norwood), O.
Philadelphia Thermometer Co., Philadelphia, Pa.
●Powers Regulator Co., Chicago, Ill.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Preferred Utilities Mfg. Corp., New York, N. Y.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.

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Rochester Mfg. Co., Rochester, N. Y.
Scientific Instrument Co., Detroit, Mich.
Standard Thermometer, Inc., Boston, Mass.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
Weksler Thermometer Corp., New York, N. Y.
Weston Electrical Instrument Corp., Newark, N. J.
Wheelco Instruments Co., Chicago, Ill.

THERMOMETERS, INDICATING, REMOTE-READING

Bailey Meter Co., Cleveland, O.
Bristol Co., The, Waterbury, Conn.
Defender Instrument & Regulator Co., St. Louis, Mo.
Electric Auto-Lite Co., Instrument & Gauge Div., Toledo, O.
Fee & Stemwedel, Inc., Chicago, Ill.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
G. M. Mfg. Co., New York, N. Y.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
H-B Instrument Co., Philadelphia, Pa.
Illinois Testing Laboratories, Inc., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
●Marsh Corp., Jas. P., Skokie, Ill.
Marshalltown Mfg. Co., Marshalltown, Ia.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
Moore Products Co., Philadelphia, Pa.
Penn Industrial Instrument Corp., Philadelphia, Pa.
Philadelphia Thermometer Co., Philadelphia, Pa.
●Powers Regulator Co., Chicago, Ill.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.
Rochester Mfg. Co., Rochester, N. Y.
●Sarco Co., Inc., New York, N. Y.
Scientific Instrument Co., Detroit, Mich.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Thompson Research & Mfg. Co., Davenport, Fla.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Trerice Co., H. O., Detroit, Mich.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
Weksler Themometer Corp., New York, N. Y.
Weston Electrical Instrument Corp., Newark, N. J.

THERMOMETERS, INDICATING, WALL

Bristol Co., The, Waterbury, Conn.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Electric Auto-Lite Co., Instrument & Gauge Div., Toledo, O.
Fee & Stemwedel, Inc., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
G. M. Mfg. Co., New York, N. Y.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
H-B Instrument Co., Philadelphia, Pa.
Hausman Mfg. & Sales Co., Chicago, Ill. (Indicates both temperature and humidity, showing comfort zone)
Hill, E. Vernon & Co., Chicago, Ill.
Illinois Testing Laboratories, Inc., Chicago, Ill.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
●Marsh Corp., Jas. P., Skokie, Ill.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Moeller Instrument Co., Richmond Hill, N. Y.
Palmer Thermometers, Inc., Cincinnati (Norwood), O.
Philadelphia Thermometer Co., Philadelphia, Pa.
Precision Thermometer & Instrument Co., Philadelphia, Pa.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.
●Sarco Co., Inc., New York, N. Y.
Scientific Instrument Co., Detroit, Mich.
Standard Thermometer, Inc., Boston, Mass.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
Thwing-Albert Instrument Co., Philadelphia, Pa.
Trerice Co., H. O., Detroit, Mich.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
Weksler Thermometer Corp., New York, N. Y. (Effective temperature indicator)
Weston Electrical Instrument Corp., Newark, N. J.
Wheelco Instruments Co., Chicago, Ill.

THERMOMETERS, KATA

G. M. Mfg. Co., New York, N. Y.
Hill, E. Vernon & Co., Chicago, Ill.
Palmer Thermometers, Inc., Cincinnati (Norwood), O.
Precision Thermometer & Instrument Co., Philadelphia, Pa.

THERMOSTATIC BELLOWS

See Bellows, Thermostatic and Metallic

THERMOSTATIC BI-METALS

See Bi-Metals, Thermostatic

THERMOSTATIC TRAPS

See Traps, Steam, Thermostatic

THERMOSTATS, DUCT TYPE

American District Telegraph Co., New York, N. Y.
Atlas Valve Co., Newark, N. J.
Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Burling Instrument Co., Newark, N. J.
Cam-Stat, Inc., Div. of The Paul Henry Co., Los Angeles, Calif.
Cooper Co., Clark, Palmyra, N. J.
Edison, Inc., Thomas A., Instrument Div., West Orange, N. J.
Fenwal, Inc., Ashland, Mass.
●Johnson Service Co., Milwaukee, Wis.
●Leslie Co., Lyndhurst, N. J.
●Mechanical Industries Production Co., Akron, O.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Moeller Instrument Co., Richmond Hill, N. Y.
●Perfex Corp., Milwaukee, Wis.
Philadelphia Thermometer Co., Philadelphia, Pa.
●Powers Regulator Co., Chicago, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Stevens Mfg. Co., Inc., Mansfield, O.
Tallmadge, Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
Thermac Co., Los Angeles, Calif.
●United Electric Controls Co., Watertown, Mass.
Vapor Heating Corp., Chicago, Ill.
●Wiegand Co., Edwin L., Pittsburgh, Pa.
●White-Rodgers Electric Co., St. Louis, Mo.

THERMOSTATS, EFFECTIVE TEMPERATURE

Barber-Colman Co., Rockford, Ill.
Cooper Co., Clark, Palmyra, N. J.
●Illinois Engineering Co., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
●Powers Regulator Co., Chicago, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.

THERMOSTATS, IMMERSION

●Armstrong Machine Wks., Three Rivers, Mich.
Atlas Valve Co., Newark, N. J.
Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Burling Instrument Co., Newark, N. J.
Cam-Stat, Inc., Div. of The Paul Henry Co., Los Angeles, Calif.
Cooper Co., Clark, Palmyra, N. J.
Detroit Lubricator Co., Detroit, Mich.
Edison, Inc., Thomas A., Instrument Div., West Orange, N. J.
Fenwal, Inc., Ashland, Mass.
●General Controls Co., Glendale, Calif.
H-B Instrument Co., Philadelphia, Pa.
Hart Mfg. Co., Hartford, Conn.
Industrial Engineering Corp., Terre Haute, Ind.
Iron Fireman Mfg. Co., Cleveland, O.
●Johnson Service Co., Milwaukee, Wis.
●Leslie Co., Lyndhurst, N. J.
●Mechanical Industries Production Co., Akron, O.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
●Penn Electric Switch Co., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
Philadelphia Thermometer Co., Philadelphia, Pa.
●Powers Regulator Co., Chicago, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
Thermac Co., Los Angeles, Calif.
Thwing-Albert Instrument Co., Philadelphia, Pa.
●United Electric Controls Co., Watertown, Mass.
Vapor Heating Corp., Chicago, Ill.
Vulcan Electric Co., Danvers, Mass.
White Mfg. Co., St. Paul, Minn.
●White-Rodgers Electric Co., St. Louis, Mo.
●Wiegand Co., Edwin L., Pittsburgh, Pa.
Wilcolator Co., Elizabeth, N. J.

THERMOSTATS, RADIANT HEAT

Detroit Lubricator Co., Detroit, Mich.
Edison, Inc., Thomas A., Instrument Div., West Orange, N. J.
●General Controls Co., Glendale, Calif.

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Iron Fireman Mfg. Co., Cleveland, O.
●Mercoid Corp., The, Chicago, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
●Thrush & Co., H. A., Peru, Ind.
●White-Rodgers Electric Co., St. Louis, Mo.

THERMOSTATS, ROOM OR WALL

A-P Controls Corp., Milwaukee, Wis.
Acro Mfg. Co., The, Columbus, O.
●Armstrong Machine Wks., Three Rivers, Mich.
Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Cam-Stat, Inc., Div. of The Paul Henry Co., Los Angeles, Calif.
Crown Controls Co., Inc., New Bremen, O.
Detroit Lubricator Co., Detroit, Mich.
●General Controls Co., Glendale, Calif.
Gleason-Avery, Inc., Auburn, N. Y.
●Hoffman Specialty Co., Indianapolis, Ind.
Industrial Engineering Corp., Terre Haute, Ind.
Iron Fireman Mfg. Co., Cleveland, O.
●Johnson Service Co., Milwaukee, Wis.
McCorkle Co., D. H., Berkeley, Calif.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Penn Electric Switch Co., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
●Powers Regulator Co., Chicago, Ill.
Sampsel Time Control, Inc., Spring Valley, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Thrush & Co., H. A., Peru, Ind.
Triplex Heating Specialty Co., Inc., Peru, Ind.
●United Electric Controls Co., Watertown, Mass.
Vapor Heating Corp., Chicago, Ill.
White Mfg. Co., St. Paul, Minn.
●White-Rodgers Electric Co., St. Louis, Mo.
●Wiegand Co., Edwin L., Pittsburgh, Pa.

THERMOSTATS, SURFACE

Autempco Corp., New York, N. Y.
Barber-Colman Co., Rockford, Ill.
Cam-Stat, Inc., Div. of The Paul Henry Co., Los Angeles, Calif.
Cooper Co., Clark, Palmyra, N. J.
Detroit Lubricator Co., Detroit, Mich.
Fenwal, Inc., Ashland, Mass.
●General Controls Co., Glendale, Calif.
Hart Mfg. Co., Hartford, Conn.
●Hoffman Specialty Co., Indianapolis, Ind.
Industrial Engineering Corp., Terre Haute, Ind.
McCorkle Co., D. H., Berkeley, Calif.
●Mechanical Industries Production Co., Akron, O.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Penn Electric Switch Co., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
●Powers Regulator Co., Chicago, Ill.
Red Spot Electric Co., Tacoma, Wash.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Stevens Mfg. Co., Inc., Mansfield, O.
Therm-O-Disc, Inc., Mansfield, O.
Triplex Heating Specialty Co., Inc., Peru, Ind.
●United Electric Controls Co., Watertown, Mass.
Westinghouse Electric Corp., Pittsburgh, Pa
White Mfg. Co., St. Paul, Minn.
●White-Rodgers Electric Co., St. Louis, Mo.
●Wiegand Co., Edwin L., Pittsburgh, Pa.

THERMOSTATS, TWO TEMPERATURE OR DUAL

Autempco Corp., New York, N. Y.
●Barber-Colman Co., Rockford, Ill.
Burling Instrument Co., Newark, N. J.
Detroit Lubricator Co., Detroit, Mich.
●General Controls Co., Glendale, Calif.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Gleason-Avery, Inc., Auburn, N. Y.
H-B Instrument Co., Philadelphia, Pa.
●Illinois Engineering Co., Chicago, Ill.
Industrial Engineering Corp., Terre Haute, Ind.
●Johnson Service Co., Milwaukee, Wis.
●Mercoid Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Perfex Corp., Milwaukee, Wis.
●Powers Regulator Co., Chicago, Ill.
Ranco, Inc., Columbus, O.
●Sarcotherm Controls, Inc., New York, N. Y.
Sampsel Time Control, Inc., Spring Valley, Ill.
●United Electric Controls Co., Watertown, Mass.
Vapor Heating Corp., Chicago, Ill.
●White-Rodgers Electric Co., St. Louis, Mo.

THERMOSTATS, WEATHER COMPENSATING

Autempco Corp., New York, N. Y.
Automatic Devices Co., Inc., Chicago, Ill.
Barber-Colman Co., Rockford, Ill.
Crown Controls Co., Inc., New Bremen, O.
Detroit Lubricator Co., Detroit, Mich.
Heat Timer Corp., New York, N. Y.
●Illinois Engineering Co., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
●Marsh Corp., Jas. P., Skokie, Ill.
McLarty Systems, Battle Creek, Mich.
Miller-Harris Instrument Co., Milwaukee, Wis.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Powers Regulator Co., Chicago, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Tallmadge, Webster, Systems, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●United Electric Controls Co., Watertown, Mass.
●Webster & Co., Warren, Camden, N. J.
●White-Rodgers Electric Co., St. Louis, Mo.

TIME SWITCHES

See Switches, Time

TOGGLE BOLTS

See Bolts, Toggle and Anchor

TONGS, PIPE

Armstrong Bros. Tool Co., Chicago, Ill.
Billings & Spencer Co., Hartford, Conn.
Trimont Mfg. Co., Div. of Aetna Industrial Corp., Boston, Mass.
Williams & Co., J. H., Buffalo, N. Y.

TOOLS (CHISELS, PLIERS, SCREW DRIVERS, ETC.)

Bernz Co., Otto, Rochester, N. Y.
Billings & Spencer Co., Hartford, Conn.
Bonney Forge & Tool Works, Allentown, Pa.
Carlson & Sullivan, Monrovia, Calif. (steel tape rule for reading diameter)
Crescent Tool Co., Jamestown, N. Y.
Duro Metal Products Co., Chicago, Ill.
Everhot Products Co., Chicago, Ill.
Greene, Tweed & Co., North Wales, Pa.
●Greenlee Tool Co., Div. of Greenlee Bros. & Co., Rockford, Ill.
●Ingersoll-Rand Co., New York, N. Y.
Interstate Sales Co., New York, N. Y. (Protractor for layout work and center-finder protractor)
Lufkin Rule Co., Saginaw, Mich. (steel tapes and folding rules)
Mall Tool Co., Chicago, Ill.
Mid-States Equipment Co., Chicago, Ill. (Saw gun)
Mid-States Welder Mfg. Co., Chicago, Ill. (heavy duty power saw and file)
Millers Falls Co., Greenfield, Mass.
Misener Mfg. Co., Inc., Syracuse, N. Y. (Rotary hole saws)
Peck, Stow & Wilcox Co., Southington, Conn.
Pioneer Tool Co., Racine, Wis.
R C S Tool Sales Corp., Joliet, Ill. (reciprocating saw attachment)
Rawlplug Co., Inc., The, New York, N. Y. (drills for masonry)
Richmont, Inc., Los Angeles, Calif.
Rotary Concrete Drill Co., Pasadena, Calif. (Drill bits)
Schild Mfg. Co., Milwaukee, Wis.
Snap-on Tools Corp., Kenosha, Wis.
Thompson & Son Co., The, Henry G., New Haven, Conn.
Three Point Industries, Chicago, Ill. (gage for determining pipe sizes)
Walton Co., Hartford, Conn. (Tap extractors)
Williams & Co., J. H., Buffalo, N. Y.

TOOLS, FLARING, FOR TUBING

Armstrong Bros. Tool Co., Chicago, Ill.
Bonney Forge & Tool Works, Allentown, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Specialty Mfg. Co., Chicago, Ill.
Duro Metal Products Co., Chicago, Ill.
Everhot Products Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Parker Appliance Co., The, Cleveland, O.
Penn Brass & Copper Co., Erie, Pa.
Sac Tool Mfg. Co., St. Louis, Mo.
Weatherhead Co., Cleveland, O.
Williams & Co., J. H., Buffalo, N. Y.
Wilson, Inc., Thomas C., Long Island City, N. Y.

TORCHES, BRAZING AND SOLDERING

Aeroil Products Co., Inc., South Hackensack, N. J.
Air Reduction Sales Co., New York, N. Y.
Atkins & Co., E. C., Indianapolis, Ind.
Bernz Co., Otto, Rochester, N. Y.
Black Mfg Co., Baltimore, Md.
Borm Mfg. Co., Elgin, Ill.
Century Aircraft Co., Los Angeles, Calif.

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Clayton & Lambert Mfg. Co., Louisville, Ky.
Dockson Corp., Detroit, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Ergolyte Mfg. Co., Philadelphia, Pa.
Eutectic Welding Alloys Corp., New York, N. Y.
General Scientific Equipment Co., Philadelphia, Pa.
Goss Gas, Inc., Pittsburgh, Pa.
Harris Calorific Co., The, Cleveland, O.
Ideal Industries, Inc., Sycamore, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Insto-Gas Corp., Detroit, Mich.
Johnson Gas Appliance Co., Cedar Rapids, Ia.
Lee Co., K. O., Aberdeen, S. D.
Lenk Mfg. Co., Boston, Mass.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Liquid Carbonic Corp., The, Chicago, Ill.
Marquette Mfg. Co., Minneapolis, Minn.
Mid-States Equipment Co., Chicago, Ill.
Minn-Kota Foundry & Mfg. Co., Fargo, N. D.
Modern Engineering Co., St. Louis, Mo.
National Cylinder Gas Co., Chicago, Ill.
Powder Weld Process Co., The, Brooklyn, N. Y.
Pressure Products Corp., Chicago, Ill.
Reiner & Campbell Co., Inc., Newark, N. J.
Sac Tool Mfg. Co., St. Louis, Mo.
Sight Feed Generator Co., West Alexandria, O.
Smith Welding Equipment Corp., Minneapolis, Minn.
Torit Mfg. Co., St. Paul, Minn.
Trindl Products, Ltd., Chicago, Ill.
Turner Brass Works, The, Sycamore, Ill.
Wall Chemicals Div. of The Liquid Carbonic Corp., Chicago, Ill.
Welding Apparatus Co., Chicago, Ill.
Will-Weld Mfg. Co., Inc., Omaha, Neb.

TORQUE INDICATING WRENCHES

See Wrenches, Torque Indicating

TOWERS, COOLING, ATMOSPHERIC

American Cooling Tower Co., Kansas City, Mo.
●Binks Mfg. Co., Chicago, Ill.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Fluor Corp., Ltd., The, Los Angeles, Calif.
Harry Cooling Towers, Inc., New York, N. J.
●Lilie-Hoffmann Cooling Towers, Inc., St. Louis, Mo.
●Marley Co., Inc., Kansas City, Kan.
New England Cooling Tower Co., Boston, Mass.
Pennsylvania Engineering Wks., New Castle, Pa.
●Phillips Cooling Tower Co., Inc., Brooklyn, N. Y.
●Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Refrigeration Appliances, Inc., Chicago, Ill.
Santa Fe Tank & Tower Co., Los Angeles, Calif.
Stewart Ice Machine Co., Pomona, Calif.
Thermal Industries, Indio, Calif.
●United Cooling Tower Co., Kansas City, Mo.
Water Cooling Corp., New York, N. Y.
Water Cooling Equipment Corp., St. Louis, Mo.
Water Cooling Tower Co., Chicago, Ill.
●Wheeler Mfg. Co., C. H., Philadelphia, Pa.

TOWERS, COOLING, MECHANICAL DRAFT

Acme Equipment Co., Muskogee, Okla.
Acme Industries, Inc., Jackson, Mich.
●Air & Refrigeration Corp., New York, N. Y.
American Cooling Tower Co., Kansas City, Mo.
●Baltimore Aircoil Co., Inc., Baltimore, Md.
●Binks Mfg. Co., Chicago, Ill.
Bush Mfg. Co., West Hartford, Conn.
Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Crowell & Dunn, Inc., New York, N. Y.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Fluor Corp., Ltd., The, Los Angeles, Calif.
Foster Wheeler Corp., New York, N. Y.
Goodfellow Co., E. D., Memphis, Tenn.
●Governair Corp., Oklahoma City, Okla.
Harry Cooling Towers, Inc., New York, N. Y.
●Kennard Corp., St. Louis, Mo.
Larkin Coils, Inc., Atlanta, Ga.
●Lilie-Hoffmann Cooling Towers, Inc., St. Louis, Mo.
●Marley Co., Inc., Kansas City, Kan.
●Marlo Coil Co., St. Louis, Mo.
Murray Mfg. Co., D. J., Wausau, Wis.
New England Cooling Tower Co., Boston, Mass.
Pennsylvania Engineering Wks., New Castle, Pa.
●Phillips Cooling Tower Co., Inc., Brooklyn, N. Y.
●Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Engineering, Inc., Los Angeles, Calif.
Santa Fe Tank & Tower Co., Los Angeles, Calif.
Tenney Engineering, Inc., Newark, N. J.
Thermal Industries, Indio, Calif.
●Trane Co., The, LaCrosse, Wis.
●United Conditioning Corp., New York, N. Y.
●United Cooling Tower Co., Kansas City, Mo.
●United States Air Conditioning Corp., Minneapolis, Minn.
Water Cooling Corp., New York, N. Y.
Water Cooling Equipment Corp., St. Louis, Mo.
Water Cooling Tower Co., Chicago, Ill.
●Wheeler Mfg. Co., C. H., Philadelphia, Pa.

TRANSFORMERS, ELECTRIC

Arjac Products Inc., Rochester, N. Y.
Bogue Electric Co., Paterson, N. J.
Canatsey Electric Mfg. Co., Kansas City, Mo.
Crown Controls Co., Inc., New Bremen, O.
Davis & Co., Dean W., Kentland, Ind.
Eisler Engineering Co., Inc., Newark, N. J.
Fluid Systems, Inc., New Haven, Conn.
●General Controls Co., Glendale, Calif.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Hampton Electric Mfg. Co., Pittsburgh, Pa.
Jefferson Electric Co., Bellwood, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Newark Transformer Co., Linden, N. J.
Rex Welder & Engineering Co., Kansas City, Mo.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Super Electric Products Corp., Jersey City, N. J.
Taylor-Winfield Corp., Warren, O.
Trindl Products, Ltd., Chicago, Ill.
●Wagner Electric Corp., St. Louis, Mo.
Webster Electric Co., Racine, Wis.
Westinghouse Electric Corp., Pittsburgh, Pa.

TRANSMISSION DRIVES

See Drives, Chain, Flat Belt and V-Belt

TRAPS, STEAM, MECHANICAL

Acker Organization, Inc., W. M., Cleveland, O.
●American District Steam Co., North Tonawanda, N. Y.
●Anderson Co., V. D., The, Cleveland, O.
●Armstrong Machine Wks., Three Rivers, Mich.
Bailey Co., Chas. M., San Francisco, Calif.
●Barnes & Jones, Inc., Boston, Mass.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Boylston Steam Specialty Co., Chicago, Ill.
Burrows Mfg. Co., F. A. York, Pa.
Cashin Co., W. D., Boston, Mass.
Clark Mfg. Co., Cleveland, O.
Coe Mfg. Co., Painesville, O.
●Crane Co., Chicago, Ill.
Cryer Trap & Valve Co., Inc., New York, N. Y.
Davis Engineering Corp., Elizabeth, N. J.
●Davis Regulator Co., Chicago, Ill.
●Dunham Co., C. A. Chicago, Ill.
Ellis Drier Co., Chicago, Ill.
●Fisher Governor Co., Marshalltown, Ia.
Healy Ruff Co., St. Paul, Minn.
●Hoffman Specialty Co., Indianapolis, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
●Illinois Engineering Co., Chicago, Ill.
Johnson Corp., The, Three Rivers, Mich.
Justus Steam Trap Co., Napanoch, N. Y.
Kaye & MacDonald, Inc., West Orange, N. J.
Keckley Co., O. C., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
Leavitt Machine Co., Orange, Mass.
●Marsh Corp., Jas. P., Skokie, Ill.
McAlear Mfg. Co., Chicago, Ill.
McAuley Trap Co., Pittsburgh, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Monash-Younker Co., Inc., Chicago, Ill.
Morehead Mfg. Co., Detroit, Mich.
Mouat Vapor Heating Co., The, Cleveland, O.
Nason Co., Detroit, Mich.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
Rockwell Co., W. S., Fairfield, Conn.
●Sarco Co., Inc., New York, N. Y.
Schaub Engineering Co., Fred H., Chicago, Ill.
Squires Co., C. E., Cleveland, O.
Sterling Engineering & Mfg. Corp., Hyde Park, Mass.
●Sterling, Inc., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., Cleveland, O.
●Swartwout Co., Cleveland, O.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
Templeton Bros., Hyde Park, Mass.
●Trane Co., The, LaCrosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Vapor Heating Corp., Chicago, Ill.
Watson & McDaniel Co., Philadelphia, Pa.
●Webster & Co., Warren, Camden, N. J.
Williams Gauge Co., The, Pittsburgh, Pa.
Wright-Austin Co., Detroit, Mich. (Combination)
●Yarnall-Waring Co., Philadelphia, Pa.

TRAPS, STEAM, THERMOSTATIC

●American District Steam Co., North Tonawanda, N. Y.
●Barnes & Jones, Inc., Boston, Mass.
●Bishop & Babcock Mfg. Co., Cleveland, O.

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Cashin Co., W. D., Boston, Mass.
Cryer Trap & Valve Co., Inc., New York, N. Y.
●Dunham Co., C. A., Chicago, Ill.
Haines & Co., Inc., William S., Div. Sellers Injector Corp., Philadelphia, Pa.
●Hoffman Specialty Co., Indianapolis, Ind.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
●Illinois Engineering Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
●Marsh Corp., Jas. P., Skokie, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Monash-Younker Co., Inc., Chicago, Ill.
Mouat Vapor Heating Co., The, Cleveland, O.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
●Powers Regulator Co., Chicago, Ill.
●Sarco Co., Inc., New York, N. Y.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
●Sterling, Inc., Milwaukee, Wis.
●Swartwout Co., Cleveland, O.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Trane Co., The, LaCrosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Vapor Heating Corp., Chicago, Ill.
Vapor Specialty Co., New York, N. Y.
●Webster & Co., Warren, Camden, N. J.

TREATMENT, FUEL OIL, TO PREVENT SLUDGE

Allen Co., Robert G., Mechanicsville, N. Y.
Alrose Chemical Co., Providence, R. I.
American Sand-Banum Co., Inc., New York, N. Y.
Ampion Corp., Long Island City, N. Y.
Anderson-Stolz Corp., Kansas City, Mo.
Bird-Archer Co., Philadelphia, Pa.
Celco Corp., New York, N. Y.
Elraco Engineering Co., Los Angeles, Calif.
Madden & Co., P. E., Chicago, Ill.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
National Airoil Burner Co., Inc., Philadelphia, Pa.
National Aluminate Corp., Chicago, Ill.
O'Brien Industries, Jersey City, N. J.
% Proportioneers, Inc. %, Providence, R. I.
Perolin Co., Inc., Chicago, Ill.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Warren Refining & Chemical Co., The, Cleveland, O.
Western Chemical Co., Kansas City, Mo.

TREATMENT, STEAM SYSTEM, TO INHIBIT CORROSION

American Water Softener Co., Philadelphia, Pa.
American Well Wks., Aurora, Ill.
Ampion Corp., Long Island City, N. Y.
Anderson-Stolz Corp., Kansas City, Mo.
Apex All Weather Products, Chicago, Ill.
Aquatrol Laboratories, Inc., Clifton, N. J.
Bird-Archer Co., Philadelphia, Pa.
●Brown Electro Co., Oklahoma City, Okla.
Calgon, Inc., Pittsburgh, Pa.
Cannon Chemical Co., Inc., Cambridge, Mass.
Carbide and Carbon Chemicals Div., Carbide & Carbon Corp., New York, N. Y.
Chemical Engineering Co., Dallas, Tex.
Cochrane Corp., Philadelphia, Pa.
Continental Products Co., Euclid, O.
Dearborn Chemical Co., Chicago, Ill.
Elgin Softener Corp., Elgin, Ill.
Fischer & Porter Co., Hatboro, Pa.
Graver Water Conditioning Co., New York, N. Y.
Haering & Co., Inc., D. W., San Antonio, Tex.
Kenite Laboratory, Inc., Madison, N. J.
Liquid Conditioning Corp., Philadelphia, Pa.
Madden & Co., P. E., Chicago, Ill.
McRay Sales Co., South Pasadena, Calif.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
Milton Roy Co., Philadelphia, Pa.
National Aluminate Corp., Chicago, Ill.
Perolin Co., Inc., Chicago, Ill.
% Proportioneers, Inc. %, Providence, R. I.
●Research Products Corp., Madison, Wis.
Rid-Sludge Div., Aulwood Mfg. Co., St. Paul Minn. (vapor treatment to remove sludge from heating system)
Saverite Engineering Co., Hoboken, N. J.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Sulflo, Inc., Elizabeth, N. J.
Turco Products, Inc., Los Angeles, Calif.
Vinco Co., Inc., The, New York, N. Y.
Warren Refining & Chemical Co., Cleveland, O.
Water Treatment Co. of America, Pittsburgh, Pa.
Western Chemical Co., Kansas City, Mo.
X Laboratories, Inc., New York, N. Y.

TREATMENT, WATER, TO INHIBIT CORROSION

●Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Cyanamid & Chemical Corp., New York, N. Y.
American K. A. T. Corp., Garwood, N. J.
American Water Softener Co., Philadelphia, Pa.
American Well Works, Aurora, Ill.
Ampion Corp., Long Island City, N. Y.
Anderson-Stolz Corp., Kansas City, Mo.
Aquatrol Laboratories, Inc., Clifton, N. J.
Bird-Archer Co., Philadelphia, Pa.
Bogue Electric Co., Paterson, N. J.
Brown Electro Co., Oklahoma City, Okla.
Calgon, Inc., Pittsburgh, Pa.
Cannon Chemical Co., Inc., Cambridge, Mass.
Carbide and Carbon Chemicals Div., Carbide & Carbon Corp., New York, N. Y.
Chemical Engineering Co., Dallas, Tex.
Cochrane Corp., Philadelphia, Pa.
Dearborn Chemical Co., Chicago, Ill.
Dowell Inc., Tulsa, Okla.
Elgin Softener Corp., Elgin, Ill.
Ferro-Nil Corp., New York, N. Y.
Filtrine Mfg. Co., Inc., Brooklyn, N. Y.
Fischer & Porter Co., Hatboro, Pa.
General Filter Co., Ames, Ia.
Graver Water Conditioning Co., New York, N. Y.
Grief, Edward C., Bogota, N. J.
Haering & Co., Inc., D. W., San Antonio, Tex.
Hagan Corp., Pittsburgh, Pa.
Heilman Boiler Wks., Inc., Allentown, Pa.
Kenite Laboratory, Inc., Madison, N. J.
Layne & Bowler, Inc., Memphis, Tenn.
Liquid Conditioning Corp., Philadelphia, Pa.
Madden & Co., P. E. Chicago, Ill.
Maintenance Engineering Corp., Houston, Tex.
McRay Sales Co., South Pasadena, Calif.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
Milton Roy Co., Philadelphia, Pa.
Monsanto Chemical Co., St. Louis, Mo.
National Aluminate Corp., Chicago, Ill.
North American Fibre Products Co., The, Cleveland, O.
O'Brien Industries, Jersey City, N. J.
%Proportioneers, Inc., %, Providence, R. I.
Permutit Co., New York, N. Y.
Perolin Co., Inc., Chicago, Ill.
Refinite Corp., Omaha, Nebr.
●Research Products Corp., Madison, Wis.
Rodwell Engineering & Sales Co., Omaha, Neb.
Saverite Engineering Co., Hoboken, N. J.
S. O. S. Products Co., Inc., Brooklyn, N. Y.
Sudbury Laboratory, South Sudbury, Mass.
Sulflo, Inc., Elizabeth, N. J.
Turco Products, Inc., Los Angeles, Calif.
Uniflow Mfg. Co., Erie, Pa.
Vinco Co., Inc., The, New York, N. Y.
Wallace & Tiernan Co., Inc., Newark, N. J.
Warlo Corp., New York, N. Y.
Water Refining Co., Ft. Wayne, Ind.
Water Service Laboratories, Inc., New York, N. Y.
Water Treatment Company of America, Pittsburgh, Pa.
Western Chemical Co., Kansas City, Mo.
Worthington Pump & Machinery Corp., Harrison, N. J.
X Laboratories, Inc., New York, N. Y.

TREATMENT; WATER, FOR SLIME AND ALGAE CONTROL

Alrose Chemical Co., Providence, R. I.
American Sand-Banum Co., Inc. New York, N. Y.
American Water Softener Co., Philadelphia, Pa.
American Well Works, Aurora, Ill.
Ampion Corp., Long Island City, N. Y.
Anderson-Stolz Corp., Kansas City, Mo.
Aquatrol Laboratories, Inc., Clifton, N. J.
Bird-Archer Co., Philadelphia, Pa.
Brown Electro Co., Oklahoma City, Okla.
Carbide and Carbon Chemicals Div., Union Carbide and Carbon Corp., New York, N. Y.
Carolina Aniline & Extract Co., Charlotte, N. C.
Chemical Engineering Co., Dallas, Tex.
Chemical Solvent Co., Birmingham, Ala.
Dearborn Chemical Co., Chicago, Ill.
Dowell Inc., Tulsa, Okla.
Fischer & Porter Co., Hatboro, Pa.
General Filter Co., Ames, Ia.
General Ozone Corp., Chicago, Ill.
Graver Water Conditioning Co., New York, N. Y.
Haering & Co., Inc., D. W., San Antonio, Tex.
Hagan Corp., Pittsburgh, Pa.
Kenite Laboratory, Inc., Madison, N. J.
Layne & Bowler, Inc., Memphis, Tenn.
Liquid Conditioning Corp., Philadelphia, Pa.
Madden & Co., P. E., Chicago, Ill.
McRay Sales Co., South Pasadena, Calif.
Metropolitan Refining Co., Inc., Long Island City, N. Y.
Milton Roy Co., Philadelphia, Pa.
Monsanto Chemical Co., St. Louis, Mo.
National Aluminate Corp., Chicago, Ill.
Norwood Filtration Co., The, Holyoke, Mass.
Oakite Products. Inc., New York, N. Y.
O'Brien Industries, Jersey City, N. J.
Perolin Co., Inc., Chicago, Ill.
% Proportioneers, Inc., %, Providence, R. I.

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Permutit Co., New York, N. Y.
Refinite Corp., Omaha, Nebr.
Solvay Sales Div., Allied Chemical & Dye Corp., New York, N. Y.
Wallace & Tiernan Co., Inc., Newark, N. J.
Western Chemical Co., Kansas City, Mo.

TRY-COCKS, BOILER

Bailey Co., Chas. M., San Francisco, Calif.
Chicago Specialty Mfg. Co., Chicago, Ill.
●Crane Co., Chicago, Ill.
Detroit Brass & Malleable Works, Detroit, Mich.
Diamond Power Specialty Corp., Lancaster, O.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Huyette Co., Inc., Paul B., Philadelphia, Pa.
Keckley Co., O. C., Chicago, Ill.
Lunkenheimer Co., Cincinnati, O.
Reliance Gauge Column Co., Cleveland, O.
Robert Mfg. Co., Los Angeles, Calif.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

TUBE CLEANERS

See Cleaners, Tube

TUBES, BOILER

Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Globe Steel Tubes Co., Milwaukee, Wis.
H & H Tube & Mfg. Co., Detroit, Mich.
National Tube Co., United States Steel Corp., Sub., Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Republic Steel Corp., Steel & Tubes Div., Cleveland, O.
Standard Tube Co., Detroit, Mich.
Trent Tube Co., East Troy, Wis. (stainless)

TUBES, CONDENSER

American Brass Co., Waterbury, Conn.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bridgeport Brass Co., Bridgeport, Conn.
●Bundy Tubing Co., Detroit, Mich.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Globe Steel Tubes Co., Milwaukee, Wis.
National Tube Co., United States Steel Corp., Subsidiary, Pittsburgh, Pa.
Pacific Tube Co., Los Angeles, Calif.
Republic Steel Corp., Steel & Tubes Div., Cleveland, O.
●Revere Copper and Brass Incorporated, New York, N. Y.
Reynolds Metals Co., Louisville, Ky.
Scovill Mfg. Co., Brass Goods Div., Waterville, Conn. (copper base)
Standard Tube Co., Detroit, Mich.
Timken Roller Bearing Co., Canton, O.
Trent Tube Co., East Troy, Wis. (stainless)
Warren Foundry & Pipe Corp., New York, N. Y.
●Wolverine Tube Div., Calumet & Hecla Consolidated Copper Co., Detroit Mich.
York Corp., York, Pa.

TUBES, PITOT

Defender Instrument and Regulator Co., St. Louis, Mo.
●Dwyer Mfg. Co., F. W., Chicago, Ill.
Ellison Draft Gage Co., Chicago, Ill.
Foxboro Co., Foxboro, Mass.
Hill, E. Vernon & Co., Chicago, Ill.
Illinois Testing Laboratories, Inc., Chicago, Ill.
Meriam Instrument Co., The, Cleveland, O.
●Taylor Instrument Companies, Rochester, N. Y.

TUBING, ALUMINUM

Aluminum Co. of America, Pittsburgh, Pa.
B & M Mfg. Co., East Orange, N. J.
Colonial Alloys Co., Metals Div., Philadelphia, Pa.
Lewin-Mathes Co., Lewin Metals Div., St. Louis, Mo.
●Revere Copper and Brass Incorporated, New York, N. Y.
Reynolds Metals Co., Louisville, Ky.
●Wolverine Tube Div., Calumet & Hecla Consolidated Copper Co., Detroit, Mich.

TUBING BENDERS

See Benders, Tubing

TUBING, BRASS AND COPPER

American Brass Co., Waterbury, Conn.
B & M Mfg. Co., East Orange, N. J.
Bridgeport Brass Co., Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Everhot Products Co., Chicago, Ill.
H & H Tube & Mfg. Co., Detroit, Mich.
Hussey & Co., C. G., Pittsburgh, Pa.
Keeney Mfg. Co., Newington, Conn. (Chrome plated)
Kensico Tube Co., Mt. Kisco, N. Y.
Lewin-Mathes Co., Lewin Metals Div., St. Louis, Mo.
●Mueller Brass Co., Port Huron, Mich.
Penn Brass & Copper Co., Erie, Pa.
Phelps Dodge Copper Products Corp., British American Tube Div., New York, N. Y.
Reading Tube Corp., Long Island City, N. Y.
●Revere Copper and Brass Incorporated, New York, N. Y.
Roberts Tube Works, Detroit, Mich.
Viking Copper Tube Co., Cleveland, O.
●Wolverine Tube Div., Calumet and Hecla Consolidated Copper Co., Detroit, Mich.

TUBING, BRONZE

American Brass Co., Waterbury, Conn.
B & M Mfg. Co., East Orange, N. J.
Bridgeport Brass Co., Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
●Revere Copper and Brass, Incorporated, New York, N. Y.

TUBING CUTTERS

See Cutters, Tubing

TUBING, DUPLEX

American Brass Co., Waterbury, Conn.
American Cladmetals Co., Carnegie, Pa. (copper & stainless steel)
Bridgeport Brass Co., Bridgeport, Conn.
●Bundy Tubing Co., Detroit, Mich.
Pacific Tube Co., Los Angeles, Calif. (Non-ferrous to ferrous)
Republic Steel Corp., Steel & Tubes Div., Cleveland, O. (Steel and copper)

TUBING, FINNED

●Aerofin Corp., Syracuse, N. Y.
American Coils Co., Newark, N. J.
Brown Fintube Co., The, Elyria, O.
●Bush Mfg. Co. West Harford, Conn.
Chicago Fan & Fin Coil Co., Chicago, Ill.
●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Fintube Coil Corp., Alhambra, Calif.
●G. & O. Mfg. Co., New Haven, Conn.
Griscom-Russell Co., The, New York, N. Y.
Heat-X-Changer Co., Inc., The, New York, N. Y.
Industrial Mfg. & Engineering Co., Chicago, Ill.
●Kramer Trenton Co., Trenton, N. J.
●McCord Corp., Detroit, Mich.
Merchant & Evans Co., Philadelphia, Pa.
Minimite Co., Chicago, Ill.
Peerless of America, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
●Rempe Co., Chicago, Ill.
Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Tenney Engineering, Inc., Newark, N. J.
Thermek Sales Co., Whitewater, Wis. (spined)
Tilco-Fin-Tubing Div., David E. Kennedy, Inc., Brooklyn, N. Y.
Vapor Heating Corp., Chicago, Ill.
●Wolverine Tube Div., Calumet and Hecla Consolidated Copper Co., Detroit, Mich. (Aluminum, copper)
●Young Radiator Co., Racine, Wis.

TUBING, MAGNESIUM

B & M Mfg. Co., East Orange, N. J.
Dow Chemical Co., The, Midland, Mich.

TUBING, NICKEL AND NICKEL ALLOY

Agaloy Tubing Co., Springfield, O.
B & M Mfg. Co., East Orange, N. J.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bridgeport Brass Co., Bridgeport, Conn.
●Bundy Tubing Co., Detroit, Mich.
Electric Steel Foundry Co., Portland, Ore.
●Globe Steel Tubes Co., Milwaukee, Wis.
International Nickel Co., Inc., The, New York, N. Y.
National Tube Co., United States Steel Corp., Subsidiary, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
●Revere Copper and Brass Incorporated, New York, N. Y.
Trent Tube Co., East Troy, Wis.

TUBING, PLASTIC

Acadia Synthetic Products Div., Western Felt Works, Chicago, Ill.
American Hard Rubber Co., New York, N. Y.
Commercial Plastics Co., Chicago, Ill.
Continental-Diamond Fibre Co., Newark, Del.
Extruded Plastics, Inc., Norwalk, Conn.
Flexible Tubing Corp., Branford, Conn.
Gates Rubber Co., The, Denver, Colo.

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General Electric Co., Chemical Dept., Pittsfield, Mass.
Goodrich Co., B. F., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Haveg Corp., Newark, Del.
Irvington Varnish and Insulator Co., Irvington, N. J.
Mills Corp., Elmer E., Chicago, Ill.
Pacific States Felt & Mfg. Co., Inc., San Francisco, Calif.
Panelyte Div., St. Regis Paper Co., New York, N. Y.
Presstite Engineering Co., St. Louis, Mo.
Resistoflex Corp., Belleville, N. J.
Sandee Mfg. Co., Chicago, Ill.
United States Rubber Co., New York, N. Y.
United States Stoneware Co., New York, N. Y.
Yardley Plastics Co., Columbus, O.

TUBING, SILVER CLAD AND SILVER ALLOY

Baker & Co., Inc., Newark, N. J.
General Plate Div., Metals & Controls Corp., Attleboro, Mass.
●Revere Copper & Brass, Inc., New York, N. Y.

TUBING, STEEL, ALLOY, SEAMLESS

Agaloy Tubing Co., Springfield, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Electric Steel Foundry Co., Portland, Ore.
●Globe Steel Tubes Co., Milwaukee, Wis.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
National Tube Co., United States Steel Corp., Subsidiary, Pittsburgh, Pa.
Pacific Tube Co., Los Angeles, Calif.
Pittsburgh Steel Co., Pittsburgh, Pa.
●Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Timken Roller Bearing Co., Canton, O.
●Youngstown Sheet & Tube Co., Youngstown, O.

TUBING, STEEL, ALLOY, WELDED

Agaloy Tubing Co., Springfield, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Duraloy Co., Scottdale, Pa.
Electric Steel Foundry Co., Portland, Ore.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Laclede Steel Co., St. Louis, Mo.
Pacific Tube Co., Los Angeles, Calif.
Republic Steel Corp., Steel & Tubes Div., Cleveland, O.
●Revere Copper and Brass Incorporated, New York, N. Y.
●Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Standard Tube Co., Detroit, Mich.
Trent Tube Co., East Troy, Wis.
●Youngstown Sheet & Tube Co., Youngstown, O.

TUBING, STEEL, SEAMLESS

Agaloy Tubing Co., Springfield, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Everhot Products Co., Chicago, Ill.
●Globe Steel Tubes Co., Milwaukee, Wis.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
National Tube Co., United States Steel Corp., Subsidiary, Pittsburgh, Pa.
Pacific Tube Co., Los Angeles, Calif.
Parker Appliance Co., The, Cleveland, O.
Pittsburgh Steel Co., Pittsburgh, Pa.
●Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Timken Roller Bearing Co., Canton, O.
●Youngstown Sheet & Tube Co., Youngstown, O.

TUBING, STEEL, STAINLESS

Agaloy Tubing Co., Springfield, O.
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
B & M Mfg. Co., East Orange, N. J.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., Alloy Tube Div., Union, N. J.
●Globe Steel Tubes Co., Milwaukee, Wis.
National Tube Co., United States Steel Corp. Sub., Pittsburgh, Pa.
Pacific Tube Co., Los Angeles, Calif.
Republic Steel Corp., Steel & Tubes Div., Cleveland, O.
Standard Tube Co., Detroit, Mich.
Timken Roller Bearing Co., Canton, O.
Trent Tube Co., East Troy, Wis.
Tri-Clover Machine Co., Kenosha, Wis.

TUBING, STEEL, WELDED

Agaloy Tubing Co., Springfield, O.
Armco Steel Corp., Middletown, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Babcock & Wilcox Tube Co., The, Welded Tube Div., Alliance, O.
Bethlehem Steel Co., Bethlehem, Pa.
●Bundy Tubing Co., Detroit, Mich.
Everhot Products Co., Chicago, Ill.
●Globe Steel Tubes Co., Milwaukee, Wis.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Laclede Steel Co., St. Louis, Mo.
National Tube Co., United States Steel Corp., Subsidiary, Pittsburgh, Pa.
Nikoh Tube Co., Chicago, Ill.
Pacific Tube Co., Los Angeles, Calif.
Pittsburgh Steel Co., Pittsburgh, Pa.
Pittsburgh Tube Co., Pittsburgh, Pa.
Republic Steel Corp., Steel & Tubes Div., Cleveland, O.
●Revere Copper and Brass Incorporated, New York, N. Y.
Sharon Steel Corp., Sharon, Pa.
South Chester Tube Co., Chester, Pa.
●Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Standard Tube Co., Detroit, Mich.
●Wheatland Tube Co., Philadelphia, Pa.
●Youngstown Sheet & Tube Co., Youngstown, O.

TUBING, TITANIUM

Superior Tube Co., Norristown, Pa.

TURBINES, MECHANICAL DRIVE

Carling Turbine Blower Co., Worcester, Mass.
Coppus Engineering Corp., Worcester, Mass.
Dean Hill Pump Co., Indianapolis, Ind.
De Laval Steam Turbine Co., Trenton, N. J.
Elliott Co., Jeannette, Pa.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Murray Iron Wks. Co., Burlington, Ia.
Pyle-National Co., The, Chicago, Ill.
Steam Turbine Div., Worthington Pump and Machinery Corp., Wellesville, N. J.
Terry Steam Turbine Co., Hartford, Conn.
Westinghouse Electric Corp., Pittsburgh, Pa.
●Wing Mfg. Co., L. J., Linden, N. J.

2, 3 AND 4-WAY VALVES

See Valves, 2, 3 and 4-way

ULTRASONIC DUST AND FUME COLLECTION

See Collection, Dust and Fume, Ultrasonic

UNDERGROUND PIPING

See Conduit, Underground Piping

UNDERWATER HEATERS

See Heaters, Steam Jet, for Liquids

UNIONS, BRASS

Acheson Mfg. Co., Rankin, Pa.
Commonwealth Brass Corp., Detroit, Mich.
●Crane Co., Chicago, Ill.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
General Fittings Co., Providence, R. I.
Gilbert Brass Foundry Co., St. Louis, Mo.
Grabler Mfg. Co., Cleveland, O.
Imperial Brass Mfg. Co., Chicago, Ill.
Jerecki Mfg. Co., Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
King Union Co., Inc., Hillsgrove, R. I.
Lunkenheimer Co., Cincinnati, O.
●Mueller Brass Co., Port Huron, Mich.
Parker Appliance Co., The, Cleveland, O.
Phoenix Brass Fittings Corp., Irvington, N. J.
Powell Co., Wm., Cincinnati, O.
●Rhode Island Fittings Co., Providence, R. I.
Union Metal Works, Chelsea, Mass.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
Weatherhead Co., The, Cleveland, O.

UNIONS, MALLEABLE, BRASS SEAT

Beaton & Corbin Mfg. Co., Southington, Conn.
Corley Co., Inc., The, Jersey City, N. J.
●Crane Co., Chicago, Ill.
Dart Mfg. Co., E. M., Providence, R. I.
Detroit Brass & Malleable Wks., Detroit, Mich.
●Fairbanks Co., New York, N. Y.
Flagg & Co., Inc., Stanley G., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
General Fittings Co., Providence, R. I.
Grabler Mfg. Co., Cleveland, O.
●Grinnell Co., Inc., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
●Jefferson Union Co., Inc., New York, N. Y.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
King Union Co., Inc., Hillsgrove, R. I.
Malleable Iron Fittings Co., Branford, Conn.
●Rhode Island Fittings Co., Providence, R. I.
Rockwood Sprinkler Co., Worcester, Mass.

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Stockham Valves & Fittings, Birmingham, Ala.
●Walworth Co., New York, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.

UNIONS, ORIFICE

Altens Foundry & Machine Works, Inc., Lancaster, O.
Catawissa Valve & Fittings Co., Catawissa, Pa.
Conoflow Corp., Philadelphia, Pa.
Flori Pipe Co., The, St. Louis, Mo.
●Taylor Forge & Pipe Wks., Chicago, Ill.
Watson-Stillman Co., Roselle, N. J.

UNIONS, STEEL

Alloy Steel Products Co., Linden, N. J. (Stainless steel)
Capitol Mfg. & Supply Co., Columbus, O.
Catawissa Valve & Fittings Co., Catawissa, Pa.
Champion Machine & Forging Co., Cleveland, O.
●Crane Co., Chicago, Ill.
Dart Mfg. Co., E. M., Providence, R. I.
DAS Div. of Defiance Automatic Screw Co., Defiance, O.
●Fairbanks Co., New York, N. Y.
Flori Pipe Co., The, St. Louis, Mo.
●Frick Co., Waynesboro, Pa.
Gilbert Brass Foundry Co., St. Louis, Mo.
Hasco Valve & Machine Co., Milwaukee, Wis. (Stainless steel and alloy only)
●Henry Valve Co., Melrose Park, Ill.
Rockwood Sprinkler Co., Worcester, Mass.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

UNIT COOLERS

See Coolers, Unit

UNIT HEATERS

See Heaters, Unit

UNIT VENTILATORS

See Ventilators, Unit

UNITS, AIR CONDITIONING, CENTRAL STATION TYPE

Self contained blower, heating and/or cooling coil, filter, humidifier unit for remote location and duct air distribution

●Air & Refrigeration Corp., New York, N. Y.
Alton Mfg. Co., Dallas, Tex.
●American Blower Corp., Detroit, Mich.
American Cooling Tower Co., Kansas City, Mo.
American Thermal Industries, Inc., Detroit, Mich.
Anetsberger Bros., Inc., Northbrook, Ill.
Bahnson Co., Winston-Salem, N. C.
Baker Refrigeration Corp., South Windham, Me.
Bayley Blower Co., Milwaukee, Wis.
Blazer, M., & Son, Passaic, N. J.
●Bryant Heater Div., Affiliated Gas Equipment Co. Inc., Cleveland, O.
Buensod-Stacey, Inc., New York, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
●Clarage Fan Co., Kalamazoo, Mich.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Drayer & Hanson, Inc., Los Angeles, Calif.
Drying Systems, Inc., Chicago, Ill.
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Engineering & Mfg. Co., St. Louis, Mo.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
●Governair Corp., Oklahoma City, Okla.
Hastings Air Conditioning Co., Hastings, Neb.
Howe Ice Machine Co., Chicago, Ill.
Jaden Mfg. Co., Hastings, Neb.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
●Kramer Trenton Co., Trenton, N. J.
●Marlo Coil Co., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
Meyer Furnace Co., The, Peoria, Ill.
Nevinger Mfg. Co., Inc., Greenville, Ill.
●Niagara Blower Co., New York, N. Y.
Palmer Mfg. Corp., Phoenix, Ariz.
Parks-Cramer Co., Fitchburg, Mass.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
Rigidbilt Inc., Chicago, Ill.
Rinehart Inc., Richmond, Ind.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Sterling Air Conditioning Corp., Washington, D. C.
Surface Combustion Corp., Toledo, O.
Temp-Control Inc., Peoria, Ill.
●Trane Co., The, La Crosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
●United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

UNITS, AIR CONDITIONING, HORIZONTAL PACKAGE TYPE

Self contained blower, cooling and/or heating coil, filter, humidifier unit for ceiling or platform location in space conditioned, for connection to remote compressor or cold water supply, and steam or hot water

●Air & Refrigeration Corp., New York, N. Y.
Airecon Industries, Detroit, Mich.
American Thermal Industries, Inc., Detroit, Mich.
Baker Refrigeration Corp., South Windham, Me.
Blazer, M., & Son, Passaic, N. J.
Buensod-Stacey, Inc., New York, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
●Bush Mfg. Co., West Hartford, Conn.
Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
●Clarage Fan Co., Kalamazoo, Mich.
Conditionaire Unit Co., Chicago, Ill.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Drayer & Hanson, Inc., Los Angeles, Calif.
Drying Systems, Inc., Chicago, Ill.
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
●Governair Corp., Oklahoma City, Okla.
Hastings Air Conditioning Co., Hastings, Neb.
Jaden Mfg. Co., Hastings, Neb.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
King Co., The, Owatonna, Minn.
●Kramer Trenton Co., Trenton, N. J.
●Marlo Coil Co., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
Nevinger Mfg. Co., Inc., Greenville, Ill.
●Niagara Blower Co., New York, N. Y.
Parks-Cramer Co., Fitchburg, Mass.
Refrigeration Appliances Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
●Rempe Co., Chicago, Ill.
Rigidbilt Inc., Chicago, Ill.
Rinehart Inc., Richmond, Ind.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Temp-Control Inc., Peoria, Ill.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, La Crosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

UNITS, AIR CONDITIONING, INDUSTRIAL TYPE

●Air & Refrigeration Corp., New York, N. Y.
Airecon Industries, Detroit, Mich.
●American Blower Corp., Detroit, Mich.
American Cooling Tower Co., Kansas City, Mo.
American Thermal Industries, Inc., Detroit, Mich.
Anetsberger Bros., Inc., Northbrook, Ill.
Baker Refrigeration Corp., South Windham, Me.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Blazer, M., & Son, Passaic, N. J.
●Buffalo Forge Co., Buffalo, N. Y.
●Bush Mfg. Co., West Hartford, Conn.
Carrier Corp., Syracuse, N. Y.
●Clarage Fan Co., Kalamazoo, Mich.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Drayer & Hanson, Inc., Los Angeles, Calif.
Drying Systems, Inc., Chicago, Ill.
Economy Equipment Co., Chicago, Ill.
●Frick Co., Waynesboro, Pa.
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Engineering & Mfg. Co., St. Louis, Mo.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
●Governair Corp., Oklahoma City, Okla.
Haertel Co., Walter, Minneapolis, Minn.
Howe Ice Machine Co., Chicago, Ill.
Industrial Mfg. & Engineering Co., Chicago, Ill.
Jaden Mfg. Co., Hastings, Neb.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
King Co., The, Owatonna, Minn.
●Kramer Trenton Co., Trenton, N. J.

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Larkin Coils, Inc., Atlanta, Ga.
Lintern Co., Berea, O.
●Marlo Coil Co., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
Nevinger Mfg. Co., Inc., Greenville, Ill.
●New York Blower Co., Chicago, Ill. (Make-up air units)
●Niagara Blower Co., New York, N. Y.
Parks-Cramer Co., Fitchburg, Mass.
Pfening Co., Fred D., Columbus, O.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Refrigeration Engineering, Inc., Los Angeles, Calif.
Remington Air Conditioning Div., Remington Corp., Cortland, N. Y.
●Rempe Co., Chicago, Ill.
Rigidbilt Inc., Chicago, Ill.
Rinehart Inc., Richmond, Ind.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Somers, Inc., H. J., Detroit, Mich.
Surface Combustion Corp., Toledo, O.
Temp-Control, Inc., Peoria, Ill.
●Trane Co., The, La Crosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
●United States Air Conditioning Corp., Minneapolis, Minn.
Vilter Mfg. Co., Milwaukee, Wis.
Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.
●Young Radiator Co., Racine, Wis.

UNITS, AIR CONDITIONING, REVERSE REFRIGERATION CYCLE

Drayer & Hanson, Inc., Los Angeles, Calif.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Engineering & Mfg. Co., St. Louis, Mo.
Muncie Gear Works, Inc., Muncie, Ind.
Northwest Heating, Inc., Portland, Ore.
Terra-Temp Co., Inc., Indianapolis, Ind.
Webber Engineering Corp., Indianapolis, Ind.
York Corp., York, Pa.

UNITS, AIR CONDITIONING, SUMMER, EVAPORATIVE COOLING TYPE

For cooling by evaporation, no dehumidification

Air Equipment Co., Denver, Colo.
●Air & Refrigeration Corp., New York, N. Y.
Alton Mfg. Co., Dallas, Tex.
●American Blower Corp., Detroit, Mich.
American Cooling Tower Co., Kansas City, Mo.
Aqua-Mist Co., Topeka, Kans.
Auburn Foundry, Inc., Stoker Div., Auburn, Ind.
Bahnson Co., Winston-Salem, N. C.
Barwick Mfg. Corp., Wichita, Kan.
Buensod-Stacey, Inc., New York, N. Y.
Campbell Co., E. K., Kansas City, Mo.
Carrier Corp., Syracuse, N. Y.
Central States Mfg. Co., Inc., Arkansas City, Kan.
Climax Machinery Co., Indianapolis, Ind.
Comfort Products Corp., Dallas, Tex.
Dearborn Stove Co., Dallas, Tex.
Essick Mfg. Co., Los Angeles, Calif.
●Farr Co., Los Angeles, Calif.
Goettl Bros. Metal Prod., Inc., Phoenix, Ariz.
Great National Air Conditioning Corp., Oklahoma City, Okla.
Heating Assurance, Inc., Spokane, Wash.
International Metal Products Co., Phoenix, Ariz.
Kool-Sleep, Inc., Cambridge, O.
Lennox Furnace Co., Marshalltown, Ia., Syracuse, N. Y., & Columbus, O.
●Little Giant Vaporizer Co., Inc., Oklahoma City, Okla.
Martin Fan & Blower Co., Chicago, Ill.
Montag Stove & Furnace Works, Portland, Ore.
Morey, Dan, Los Angeles, Calif. (aspen fiber replacement mats)
Mountain States Equipment Co., Denver, Colo.
National Engineering & Mfg. Co., Kansas City, Mo.
National Gas Equipment Co., Inc., Terrell, Tex.
Ohio Foundry & Mfg. Co., Steubenville, O.
Palmer Mfg. Co., Phoenix, Ariz.
Payne Furnace Div., Affiliated Gas Equipment, Inc., Monrovia, Calif.
Polaire Cooler Co., Inc., Phoenix, Ariz.
Rheem Mfg. Co., New York, N. Y.
Rhode Island Humidifier & Ventilating Co., Boston, Mass.
United Electric Service Co., Wichita Falls, Tex.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.
Western Blower Co., Seattle, Wash.
X L Refrigerating Co., Chicago, Ill.

UNITS, AIR CONDITIONING, SUMMER, ROOM TYPE, FLOOR CABINET, REMOTE COMPRESSOR OR COLD WATER, UNDER 3 TONS CAPACITY

Self contained blower, coil, filter unit for connection to remote compressor or cold water supply

Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Hastings Air Conditioning Co., Hastings, Neb.
Ilg Electric Ventilating Co., Chicago, Ill.
International Mfg. Co., Oklahoma City, Okla.
Jaden Mfg. Co., Hastings, Neb.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
Nat Corp., Kansas City, Mo.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Rinehart Inc., Richmond, Ind.
Scott-Newcomb, Inc., St. Louis, Mo.
Temp-Control Inc., Peoria, Ill.
●Trane Co., The, La Crosse, Wis.
Unified Air Conditioner Co., Duluth, Minn.
●United States Air Conditioning Corp., Minneapolis, Minn.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

UNITS, AIR CONDITIONING, SUMMER, ROOM TYPE, FLOOR CABINET, SELF CONTAINED COMPRESSOR, UNDER 3 HP

Self contained blower, coil, compressor, filter unit

Ajax Corp. of America, Chicago, Ill.
Automatic Firing Corp., St. Louis, Mo.
Baker Refrigeration Corp., South Windham, Me.
Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
●Fedders-Quigan Corp., Buffalo, N. Y.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
Ilg Electric Ventilating Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Marlo Coil Co., St. Louis, Mo.
Nat Corp., Kansas City, Mo.
Pacific Mfg. Co., Cleveland, O.
Philco Corp., Philadelphia, Pa.
Remington Air Conditioning Div., Remington Corp., Cortland, N. Y.
Rinehart Inc., Richmond, Ind.
Scott-Newcomb, Inc., St. Louis, Mo.
Temp-Control Inc., Peoria, Ill.
●United States Air Conditioning Corp., Minneapolis, Minn.
●Viking Mfg. Corp., Cleveland, O.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
York Corp., York, Pa.

UNITS, AIR CONDITIONING, SUMMER, STORE TYPE, FLOOR CABINET, SELF CONTAINED COMPRESSOR, 3 HP AND OVER

Self contained blower, coil, compressor, filter unit with air discharge approximately 6 ft above floor

Ajax Corp. of America, Chicago, Ill.
American Thermal Industries, Inc., Detroit, Mich.
Automatic Firing Corp., St. Louis, Mo.
Baker Refrigeration Corp., South Windham, Me.
●Brunner Mfg. Co., Utica, N. Y.
Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
●Clarage Fan Co., Kalamazoo, Mich.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
●Frick Co., Waynesboro, Pa.
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Engineering & Mfg. Co., St. Louis, Mo.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
●Governair Corp., Oklahoma City, Okla.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Nat Corp., Kansas City, Mo.
Nevinger Mfg. Co., Inc., Greenville, Ill.
Refrigeration Appliances, Inc., Chicago, Ill.
Rinehart Inc., Richmond, Ind.
Scott-Newcomb, Inc., St. Louis, Mo.
Sterling Air Conditioning Corp., Washington, D. C.
Temp-Control Inc., Peoria, Ill.
●Trane Co., The, LaCrosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
●United Conditioning Corp., New York, N. Y.
●United States Air Conditioning Corp., Minneapolis, Minn.
Viking Mfg. Corp., Cleveland, O.

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●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

UNITS, AIR CONDITIONING, WINTER, ROOM TYPE, FLOOR CABINET

Self contained blower, filter, heating coil, humidifier unit

●Air & Refrigeration Corp., New York, N. Y.
●Aladdin Heating Corp., Oakland, Calif.
Auburn Burner Co., Auburn, Ind.
Baker Refrigeration Corp., South Windham, Me.
●Bryant Industrial Div., Affiliated Gas Equipment Co., Inc., Cleveland, O.
●Buffalo Forge Co., Buffalo, N. Y.
●Campbell Heating Co., Des Moines, Ia.
Carrier Corp., Syracuse, N. Y.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
●Clarage Fan Co., Kalamazoo, Mich.
Dalzen Tool & Mfg. Co., Detroit, Mich.
Drayer & Hanson, Inc., Los Angeles, Calif.
Ilg Electric Ventilating Co., Chicago, Ill.
Johnson Co., S. T., Philadelphia, Pa.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Kehm Corp., The, Chicago, Ill.
●Kennard Corp., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
Refrigeration Economics Co., Inc., Canton, O.
●Reznor Mfg. Co., Mercer, Pa.
Somers, Inc., H. J., Detroit, Mich.
Surface Combustion Corp., Toledo, O.
●Trane Co., The, La Crosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
Unified Air Conditioner Co., Duluth, Minn.
●United States Air Conditioning Corp., Minneapolis, Minn.
United States Radiator Corp., Detroit, Mich.
Viking Mfg. Corp., Cleveland, O.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
York Corp., York, Pa.

UNITS, AIR CONDITIONING, YEAR AROUND, ROOM TYPE, FLOOR CABINET

Self contained blower, cooling and heating coil, filter, humidifier unit for connection to remote compressor or cold water supply, and steam or hot water supply

●Air & Refrigeration Corp., New York, N. Y.
Auburn Burner Co., Auburn, Ind.
Baker Refrigeration Corp., South Windham, Me.
●Buffalo Forge Co., Buffalo, N. Y.
●Bush Mfg. Co., West Hartford, Conn.
Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
●Clarage Fan Co., Kalamazoo, Mich.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., St. Louis, Mo.
Drayer & Hanson, Inc., Los Angeles, Calif.
Frigidaire Div., General Motors Corp., Dayton, O.
General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
General Engineering & Mfg. Co., St. Louis, Mo.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Hastings Air Conditioning Co., Hastings, Neb.
International Mfg. Co., Oklahoma City, Okla.
Ilg Electric Ventilating Co., Chicago, Ill.
Jaden Mfg. Co., Hastings, Neb.
Johnson Co., S. T., Philadelphia, Pa.
Kauffman Air Conditioning Corp., St. Louis, Mo.
●Kennard Corp., St. Louis, Mo.
●Kramer Trenton Co., Trenton, N. J.
●Marlo Coil Co., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
Nat Corp., Kansas City, Mo.
●Niagara Blower Co., New York, N. Y.
Refrigeration Appliances, Inc., Chicago, Ill.
Refrigeration Economics Co., Inc., Canton, O.
Remington Air Conditioning Div., Remington Corp., Cortland, N. Y.
Temp-Control Inc., Peoria, Ill.
●Trane Co., The, La Crosse, Wis.
Typhoon Air Conditioning Co., Inc., Brooklyn, N. Y.
Unified Air Conditioner Co., Duluth, Minn.
●United States Air Conditioning Corp., Minneapolis, Minn.
Viking Mfg. Corp., Cleveland, O.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
York Corp., York, Pa.

UNITS, CONDENSATE DISPOSAL, FOR AIR CONDITIONING EQUIPMENT

Eastern Industries, Inc., New Haven, Conn.
●Little Giant Vaporizer Co., Inc., Oklahoma City, Okla.

UNITS, COOLING, WINDOW TYPE

Ajax Corp. of America, Chicago, Ill.
Automatic Firing Corp., St. Louis, Mo.
Baltimore Porcelain Steel Corp., Baltimore, Md.
Carrier Corp., Syracuse, N. Y.
Chrysler Airtemp, Div. of Chrysler Corp., Dayton, O.
Crowell & Dunn, Inc., New York, N. Y.
●Fedders-Quigan Corp., Buffalo, N. Y.
Frigidaire Div., General Motors Corp., Dayton, O.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Mitchell Mfg. Co., Chicago, Ill.
National Engineering & Mfg. Co., Kansas City, Mo.
National Gas Equipment Co., Inc., Terrell, Tex.
Pacific Mfg. Co., Cleveland, O.
Pleasantaire Corp., Washington, D. C.
Remington Air Conditioning Div., Remington Corp., Cortland, N. Y.
Sterling Air Conditioning Corp., Washington, D. C.
●United States Air Conditioning Corp., Minneapolis, Minn.
Viking Mfg. Corp., Cleveland, O.
York Corp., York, Pa.

UNITS, FUEL OIL, HEATING, PUMPING AND STRAINING

●Condenser Service & Engineering Co., Inc., Hoboken, N. J.
●Davis Engineering Corp., Elizabeth, N. J.
Drying Systems, Inc., Chicago, Ill.
Engineer Co., New York, N. Y.
Faber Engineer Co., Philadelphia, Pa.
Foster Pump Wks., Inc., Brooklyn, N. Y.
Graham Mfg. Co., Inc., New York, N. Y.
Iron City Chemical Co., Evans City, Pa.
Lancaster Heat Transfer Co., Inc., Brooklyn, N. Y.
Leahy Mfg. Co., Los Angeles, Calif.
National Airoil Burner Co., Inc., Philadelphia, Pa.
Peabody Engineering Corp., New York, N. Y.
●Ray Oil Burner Co., San Francisco, Calif.
Staples & Pfeiffer, San Francisco, Calif.
Todd Shipyards Corp., Combustion Equipment Div., Elmhurst, L. I., N. Y.
Tuthill Pump Co., Chicago, Ill.

UNITS, STERILIZING, AIR

Air Purification Service, Inc., New York, N. Y.
●Brundage Co., The, Kalamazoo, Mich.
Frigidaire Div., General Motors Corp., Dayton, O.
Germatrol Corp., Pittsburgh, Pa.
Hanovia Chemical & Mfg. Co., Newark, N. J.
Health Trola Div., Excel Heating & Air Conditioning Co., Chicago, Ill.
Lientz Co., B. P., Kansas City, Mo.
National Air Conditioning, Inc., Johnstown, Pa.
Pittsburgh Chemical Laboratories, Inc., Pittsburgh, Pa.
Robertson Sons, Inc., M. F., Lansdowne, Pa.

UNITS, WINDOW VENTILATOR AND FILTER

Airgard Mfg. Co., Chicago, Ill.
American Coolair Corp., Jacksonville, Fla.
Bern's Mfg. Co., Chicago, Ill.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
Goettl Bros. Metal Prod., Inc., Phoenix, Ariz.
Health Trola Div., Excel Heating & Air Conditioning Co., Chicago, Ill.
Ilg Electric Ventilating Co., Chicago, Ill.
Kaiser Co., H. S., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Meier Electric & Machine Co., Inc., Indianapolis, Ind.
Mellish & Murray Co., Chicago, Ill.
Palmer Mfg. Corp., Phoenix, Ariz.
Reed Unit-Fans, Inc., New Orleans, La.
Reliable Metal Engineering Co., Chicago, Ill.
Remington Air Conditioning Div., Remington Corp., Cortland, N. Y
Schwitzer-Cummins Co., Indianapolis, Ind.
Somers Inc., H. J., Detroit, Mich.
Standard Electric Mfg. Co., West Berlin, N. J.
Unified Air Conditioner Co., Duluth, Minn.
Utility Appliance Corp., Los Angeles, Calif.

UNIVERSAL JOINTS

See Joints, Universal, for Operating Valves

VACUUM CLEANERS FOR BOILERS

See Cleaners, Vacuum, for Boilers

VACUUM GAGES

See Gages, Indicating, Vacuum

VACUUM HEATING SYSTEMS

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VACUUM PUMPS

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VACUUM RECORDERS

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VALVE OPERATORS

See Operators, Valve

VALVE RESEATERS

See Reseaters, Valve

VALVES, AIR OPERATING

Bailey Co., Chas. M., San Francisco, Calif.
Barksdale Valves, Los Angeles, Calif.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Bellows Co., Akron, O.
Bristol Co., The, Waterbury, Conn.
Clark Controller Co., Cleveland, O.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Davis Regulator Co., Chicago, Ill.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
Gotham Instrument Co., Div., American Machine & Metals, Inc., New York, N. Y.
Grove Regulator Co., Oakland, Calif.
Hammel-Dahl Co., Providence, R. I.
Hunt & Son, Inc., C. B., Salem, O.
●Illinois Engineering Co., Chicago, Ill.
Keller Tool Co., Grand Haven, Mich.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Norwalk Valve Co., South Norwalk, Conn.
Paul Valve Corp., New York, N. Y.
Powell Co., Wm., The, Cincinnati, O.
R-S Products Corp., Philadelphia, Pa.
Schade Valve Mfg. Co., Philadelphia, Pa.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Wilson Engineering Corp., Chicago, Ill.

VALVES, ANGLE

Alloy Steel Products Co., Linden, N. J. (Stainless steel)
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Belknap Mfg. Co., Bridgeport, Conn.
Bordo Co., Inc., L. J., Glenside, Pa. (Plug)
Central Brass Mfg. Co., Cleveland, O.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Cleveland Brass Mfg. Co., The, Cleveland, O.
Cooper Alloy Foundry Co., The, Hillside, N. J.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Detroit Brass & Malleable Wks., Detroit, Mich.
De Zurik Shower Co., Sartell, Minn.
Duriron Co., The, Dayton, O. (acid resisting)
Edward Valves, Inc., East Chicago, Ind.
●Fairbanks Co., New York, N. Y.
Farris Engineering Corp., Palisades Park, N. J.
●Grinnell Co., Inc., Providence, R. I.
Grove Regulator Co., Oakland, Calif.
Hammel-Dahl Co., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis. (alloy)
●Henry Valve Co., Melrose Park, Ill.
Hills-McCanna Co., Chicago, Ill.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Imperial Brass Mfg. Co., Chicago, Ill.
Jacuzzi Bros., Inc., Richmond, Calif.
Jarecki Valve Div. of H. K. Porter Co., Inc., Tulsa, Okla.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Klingerit, Inc., New York, N. Y.
Kunkle Valve Co., Ft. Wayne, Ind.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Luzerne Rubber Co., Trenton, N. J. (Hard Rubber)
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marine & Industrial Products Co., Philadelphia, Pa.
Marsh Valve Co., Dunkirk, N. Y.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
Morse-Smith-Morse, Inc., Watertown, Mass.
●Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
OPW Corp., Cincinnati, O.
●Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
●Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
Schutte & Koerting Co., Philadelphia, Pa.
Scott Valve Mfg. Co., Detroit, Mich.
Shank Co., Cyrus, Chicago, Ill.
Stockham Valves & Fittings, Birmingham, Ala.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
Vacuum-Electronic Engineering Co., Brooklyn, N. Y.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Welsbach Corp., The, Kitson Div., Philadelphia, Pa.
White Flomatic Corp., Hoosick Falls, N. Y.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, BALANCING, FOR FORCED HOT WATER HEATING SYSTEMS

Detroit Lubricator Co., Detroit, Mich.
G & H Mfg. Co., Philadelphia, Pa.
General Heaters & Regulators Co., Chicago, Ill.
Hammond Brass Works, Hammond, Ind.
●Hoffman Specialty Co., Indianapolis, Ind.
Homestead Valve Mfg. Co., Coraopolis, Pa.
J O Mfg. Co., South Gate, Calif.
●Maid-O'-Mist, Inc., Chicago, Ill.
●Marsh Corp., Jas. P., Skokie, Ill.
Marsh Valve Co., Dunkirk, N. Y.
●Ohio Brass Co., Mansfield, O.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
●Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Welsbach Corp., The, Kitson Div., Philadelphia, Pa.

VALVES, BAR STOCK

Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Greer Hydraulics, Inc., Brooklyn, N. Y.
Grove Regulator Co., Oakland, Calif.
Guardian Products Corp., Michigan City, Ind.
Hammel-Dahl Co., Providence, R. I.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lunkenheimer Co., Cincinnati, O.
Paul Valve Corp., New York, N. Y.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Powell Co., Wm., The, Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Shank Co., Cyrus, Chicago, Ill.
Vacuum-Electronic Engineering Co., Brooklyn, N. Y.
●Walworth Co., New York, N. Y.
Welsbach Corp., The, Kitson Div., Philadelphia, Pa.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, BLOW-OFF

Barrett Machine Co., Pittsburgh, Pa.
Bordo Co., Inc., L. J., Glenside, Pa.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Cochrane Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Edward Valves, Inc., East Chicago, Ind.
Everlasting Valve Co., Jersey City, N. J.
●Fairbanks Co., New York, N. Y.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
●Jenkins Bros., New York, N. Y.
Keckley Co., O. C., Chicago, Ill.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Madden & Co., P. E., Chicago, Ill.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marine & Industrial Products Co., Philadelphia, Pa.
●McDonnell & Miller, Inc., Chicago, Ill.
Norgren Co., C. A., Denver, Colo.
Ohio Injector Co., Wadsworth, O.
Paul Valve Corp., New York, N. Y.
Powell Co., Wm., Cincinnati, O.
Schade Valve Mfg. Co., Philadelphia, Pa.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.
Wilson Engineering Corp., Chicago, Ill.
●Yarnall-Waring Co., Philadelphia, Pa.

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VALVES, BUTTERFLY

Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Conoflow Corp., Philadelphia, Pa.
●Crane Co., Chicago, Ill.
Davis Regulator Co., Chicago, Ill.
Fischer & Porter Co., Hatboro, Pa.
●General Controls Co., Glendale, Calif.
Hammel-Dahl Co., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis. (alloy)
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Ohio Injector Co., Wadsworth, O.
Norwalk Valve Co., South Norwalk, Conn.
Powell Co., Wm., The, Cincinnati, O.
R-S Products Corp., Philadelphia, Pa.
Rockwell Co., W. S., Fairfield, Conn.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
Tri-Clover Machine Co., Kenosha, Wis.

VALVES, CHECK

Alloy Steel Products Co., Linden, N. J. (Stainless steel)
American Hard Rubber Co., New York, N. Y. (Rubber lined)
Aminco Refrigeration Products Co., Detroit, Mich.
Amp Corp., St. Louis, Mo.
Barrett, Haentjens & Co., Hazelton, Pa.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Belknap Mfg. Co., Bridgeport, Conn.
Catawissa Valve & Fittings Co., Catawissa, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Cochrane Corp., Philadelphia, Pa.
Cooper Alloy Foundry Co., The, Hillside, N. J.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Detroit Brass & Malleable Wks., Detroit, Mich.
Durabla Mfg. Co., New York, N. Y.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Eddy Valve Co., Waterford, N. Y.
Edward Valves, Inc., East Chicago, Ind.
●Fairbanks Co., New York, N. Y.
Foster Engineering Co., Union, N. J.
●Frick Co., Waynesboro, Pa.
Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
General Ceramics & Steatite Corp., Keasbey, N. J. (chemical stoneware & porcelain)
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Greer Hydraulics, Inc., Brooklyn, N. Y.
●Grinnell Co., Inc., Providence, R. I.
Grove Regulator Co., Oakland, Calif.
Hammond Brass Works, Hammond, Ind.
Hasco Valve & Machine Co., Milwaukee, Wis. (alloy)
●Henry Valve Co., Melrose Park, Ill.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Imperial Brass Mfg. Co., Chicago, Ill.
Jacuzzi Bros., Inc., Richmond, Calif.
James-Pond-Clark, Pasadena, Calif.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Kunkle Valve Co., Fort Wayne, Ind.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead lined)
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Mansfield & Green, Cleveland, O.
McRae Valve Co., Los Angeles, Calif.
Milwaukee Valve Co., Milwaukee, Wis.
Morse-Smith-Morse Inc., Watertown, Mass.
●Mueller Brass Co., Port Huron, Mich.
Norgren Co., C. A., Denver, Colo.
Northern Indiana Brass Co., Elkhart, Ind.
Norwalk Valve Co., South Norwalk, Conn.
OPW Corp., Cincinnati, O.
●Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Parker Appliance Co., The, Cleveland, O.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Pokorney Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.
Preferred Utilities Mfg. Corp., New York, N. Y.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Rensselaer Valve Co., Cohoes, N. Y.
Ruggles-Klingemann Mfg. Co., Boston, Mass. (Bleeder type)
Schutte & Koerting Co., Philadelphia, Pa.
Scott Valve Mfg. Co., Detroit, Mich.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
Shank Co., Cyrus, Chicago, Ill.
Smolensky Valve Co., Inc., Bedford, O.
Stockham Valves & Fittings, Birmingham, Ala.
Stokes Molded Products, Inc., Trenton, N. J. (Hard rubber)
●Strong, Carlisle & Hammond Co., Cleveland, O.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.
White Flomatic Corp., Hoosick Falls, N. Y.
Whittaker Co., Wm. R., Los Angeles, Calif.
Williams Gauge Co., The, Pittsburgh, Pa. (Noiseless)
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, COMPRESSOR

Baker Refrigeration Corp., South Windham, Me.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Detroit Stamping Co., Detroit, Mich.
Durabla Mfg. Co., New York, N. Y.
Electric Sprayit Co., The, Sheboygan, Wis.
●Frick Co., Waynesboro, Pa.
●Henry Valve Co., Melrose Park, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
●Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lunkenheimer Co., Cincinnati, O.
●Mueller Brass Co., Port Huron, Mich.
OPW Corp., Cincinnati, O.
Ohio Injector Co., Wadsworth, O.
Voss Co., J. H. H., Inc., New York, N. Y.

VALVES, DIAPHRAGM

American Hard Rubber Co., New York, N. Y. (Rubber lined)
Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Bristol Co., The, Waterbury, Conn.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Duriron Co., Inc., The, Dayton, O. (acid resisting)
●Eclipse Fuel Engineering Co., Rockford, Ill.
Farris Engineering Corp., Palisades Park, N. J.
Fischer & Porter Co., Hatboro, Pa.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
Foxboro Co., Foxboro, Mass.
Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
General Ceramics & Steatite Corp., Keasbey, N. J. (Chemical stoneware & porcelain)
●General Controls Co., Glendale, Calif.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
●Grinnell Co., Providence, R. I.
Grove Regulator Co., Oakland, Calif.
Hagan Corp., Pittsburgh, Pa.
Hammel-Dahl Co., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis. (alloy)
●Henry Valve Co., Melrose Park, Ill.
Hills-McCanna Co., Chicago, Ill.
Hubbell Corp., Mundelein, Ill.
Hunt & Son, Inc., C. B., Salem, O.
●Illinois Engineering Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
Kainer & Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Kerotest Mfg. Co., Pittsburgh, Pa.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead lined)
●Leslie Co., Lyndhurst, N. J.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
McRae Valve Co., Los Angeles, Calif.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia.
●Mueller Brass Co., Port Huron, Mich.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
●National Radiator Co., The, Johnstown, Pa.
Norgren Co., C. A., Denver, Colo.
North American Mfg. Co., Cleveland, O.
Norwalk Valve Co., South Norwalk, Conn.
Parks-Cramer Co., Fitchburg, Mass.
Paul Valve Corp., New York, N. Y.
Penn Industrial Equipment Corp., Philadelphia, Pa.
Perfex Corp., Milwaukee, Wis.
●Powers Regulator Co., Chicago, Ill.
R-S Products Corp., Philadelphia, Pa.
Ross Valve Mfg. Co., Inc., Troy, N. J.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
Schade Valve Mfg. Co., Philadelphia, Pa.
●Spence Engineering Co., Inc., Walden, N. Y.
Staples & Pfeiffer, San Francisco, Calif.
●Swartwout Co., Cleveland, O.

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Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
●Trane Co., The, La Crosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Triplex Heating Specialty Co., Inc., Peru, Ind.
United States Rubber Co., New York, N. Y.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
Welsbach Corp., The, Kitson Div., Philadelphia, Pa.
●White-Rodgers Electric Co., St. Louis, Mo.

VALVES, FIRE PROTECTION, SPRINKLER SYSTEM CONTROL

Barber-Colman Co., Rockford, Ill.
●Crane Co., Chicago, Ill.
Everlasting Valve Co., Jersey City, N. J.
●Fairbanks Co., New York, N. Y.
●Grinnell Co., Inc., Providence, R. I.
Grove Regulator Co., Oakland, Calif.
Hodgman Mfg. Co., Taunton, Mass.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Ohio Injector Co., Wadsworth, O.
Raisler Corp., Grimes Sprinkler Div., New York, N. Y.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Rockwood Sprinkler Co., Worcester, Mass.
Stockham Valves & Fittings, Birmingham, Ala.
●Walworth Co., New York, N. Y.

VALVES, FLOAT

A-P Controls Corp., Milwaukee, Wis. (Oil)
●Alco Valve Co., St. Louis, Mo.
American Hard Rubber Co., New York, N. Y. (Hard rubber)
Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Beckett & Co., Inc., Thomas, Dallas, Tex.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Boylston Steam Specialty Co., Chicago, Ill.
Caldwell Co., W. E., Louisville, Ky.
●Cash Co., A. W., Decatur, Ill.
Central Brass Mfg. Co., Cleveland, O.
Cleveland Humidifier Co., Cleveland, O.
Cochrane Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
Darling Valve & Mfg. Co., Williamsport, Pa.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Detroit Lubricator Co., Detroit, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Eddy Valve Co., Waterford, N. Y.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
●Frick Co., Waynesboro, Pa.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
Hubbell Corp., Mundelein, Ill.
●Illinois Engineering Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
Locke Regulator Co., Salem, Mass.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
●Maid-O'-Mist, Inc., Chicago, Ill.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Industrial Div., Phialdelphia, Pa.
Monash-Younker Co., Chicago, Ill.
Morey, Dan, Los Angeles, Calif.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
●Perfex Corp., Milwaukee, Wis.
Phillips & Co., H. A., Chicago, Ill.
R-S Products Corp., Philadelphia, Pa.
Robert Mfg. Co., Los Angeles, Calif.
Ross Valve Mfg. Co., Inc., Troy, N. Y.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
Shade Valve Mfg. Co., Philadelphia, Pa.
Schaub Engineering Co., Fred H., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Scoville Mfg. Co., Brass Goods Div., Waterville, Conn.
Skuttle Mfg. Co., Detroit, Mich.
●Spence Engineering Co., Inc., Walden, N. Y.
Stickle Steam Specialties Co., Indianapolis, Ind.
●Swartwout Co., Cleveland, O.
Viking Air Conditioning Corp., Cleveland, O.
Watts Regulator Co., Lawrence, Mass.
Whittington Pump & Engineering Corp., Indianapolis, Ind.

VALVES, FLOW CONTROL, FOR HOT WATER HEATING SYSTEMS

Barber-Colman Co., Rockford, Ill.
●Bell & Gossett Co., Morton Grove, Ill.
General Heaters & Regulators Co., Chicago, Ill.
Hammel-Dahl Co., Providence, R. I.
Hook & Ackerman, Inc., New York, N. Y.
●Illinois Engineering Co., Chicago, Ill.
Kainer & Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
Quality Specialty Co., Inc., Philadelphia, Pa.
Sall Bros. Co., Rockford, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
●Taco Heaters, Inc., Providence, R. I.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
White Flomatic Corp., Hoosick Falls, N. Y.

VALVES, FORGED STEEL

Catawissa Valve & Fittings Co., Catawissa, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Conoflow Corp., Philadelphia, Pa.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Edward Valves, Inc., East Chicago, Ind.
Grove Regulator Co., Oakland, Calif.
●Henry Valve Co., Melrose Park, Ill.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marine & Industrial Products Co., Philadelphia, Pa.
Ohio Injector Co., Wadsworth, O.
Paul Valve Corp., New York, N. Y.
Penberthy Injector Co., Detroit, Mich.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
R-S Products Corp., Philadelphia, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Vogt Machine Co., Henry, Louisville, Ky.
Watson-Stillman Co., Roselle, N. J.

VALVES, GATE, ALLOY

Alloy Steel Products Co., Linden, N. J.
Cooper Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Edward Valves, Inc., East Chicago, Ind.
Electric Steel Foundry Co., Portland, Ore.
Hasco Valve & Machine Co., Milwaukee, Wis.
Hydro-Aire, Inc., Burbank, Calif.
●Jenkins Bros., New York, N. Y.
J O Mfg. Co., South Gate, Calif.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Milwaukee Valve Co., Milwaukee, Wis.
Ohio Injector Co., Wadsworth, O.
Powell Co., Wm., Cincinnati, O.
●Walworth Co., New York, N. Y.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.
Whittaker Co., Wm. R., Los Angeles, Calif.

VALVES, GATE, BRASS AND BRONZE

Belknap Mfg. Co., Bridgeport, Conn.
Bordo Co., Inc., L. J., Glenside, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Darling Valve Mfg. Co., Williamsport, Pa.
Detroit Brass & Malleable Wks., Detroit, Mich.
Detroit Lubricator Co., Detroit, Mich.
Eddy Valve Co., Waterford, N. Y.
Everlasting Valve Co., Jersey City, N. J.
●Fairbanks Co., New York, N. Y.
Hammond Brass Wks., Hammond, Ind.
Hinderliter Tool Co., The, Div. of H. K. Porter Co., Inc., Tulsa, Okla.
Jarecki Valve Div., H. K. Porter & Co., Inc., Tulsa, Okla.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Tin lined)
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Milwaukee Valve Co., Milwaukee, Wis.
Morrison Brothers Co., Dubuque, Ia.
Northern Indiana Brass Co., Elkhart, Ind.
OPW Corp., Cincinnati, O.
●Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Ostlind Valve, Inc., Portland, Ore.
Pittsburgh Valve & Fittings Corp., Barberton, O.

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Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Rensselaer Valve Co., Cohoes, N. Y.
Schaible Co., The, Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
Stockham Valves & Fittings, Birmingham, Ala.
●Walworth Co., New York, N. Y.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, GATE, IRON BODY

Bordo Co., Inc., L. J., Glenside, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Eddy Valve Co., Waterford, N. Y.
Everlasting Valve Co., Jersey City, N. J.
●Fairbanks Co., New York, N. Y.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead and tin lined)
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Mueller Co., Decatur, Ill.
Ohio Injector Co., Wadsworth, O.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Rensselaer Valve Co., Cohoes, N. Y.
Scott Valve Mfg. Co., Detroit, Mich.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., New York, N. Y.
Stockham Valves & Fittings, Birmingham, Ala.
●Walworth Co., New York, N. Y.
Whittaker Co., Wm. R., Los Angeles, Calif.
Williams Valve Co., D. T., Div. of The, Schaible Co., Cincinnati, O.

VALVES, GATE, MALLEABLE IRON

Bordo Co., Inc., L. J., Glenside, Pa
●Crane Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.

VALVES, GATE, STEEL

Bordo Co., Inc., L. J., Glenside, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
De Zurik Shower Co., Sartell, Minn.
Edward Valves, East Chicago, Ind.
Everlasting Valve Co., Jersey City, N. J.
Hamer Oil Tool Co., Long Beach, Calif.
●Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lead Lined Iron Pipe Co., Wakefield, Mass. (lead lined)
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Ohio Injector Co., Wadsworth, O.
Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Whittaker Co., Wm. R., Los Angeles, Calif.

VALVES, GLOBE, ALLOY

Alloy Steel Products Co., Linden, N. J.
Cooper Alloy Foundry Co., The, Hillside, N. J.
●Crane Co., Chicago, Ill.
Edward Valves, Inc., East Chicago, Ind.
Electric Steel Foundry Co., Portland, Ore.
Grove Regulator Co., Oakland, Calif.
Hammel-Dahl Co., Providence, R. I.
Hasco Valve & Machine Co., Milwaukee, Wis.
●Henry Valve Co., Melrose Park, Ill.
●Jenkins Bros., New York, N. Y.
J O Mfg. Co., South Gate, Calif.
Klingerit, Inc., New York, N. Y.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
Ohio Injector Co., Wadsworth, O.
Powell Co., Wm., Cincinnati, O.
●Walworth Co., New York, N. Y.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, GLOBE, BRASS AND BRONZE

Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Belknap Mfg. Co., Bridgeport, Conn.
Bowser, Inc., Fort Wayne, Ind.
California Brass Mfg. Co., Los Angeles, Calif.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Cleveland Brass Mfg. Co., The, Cleveland, O.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Detroit Brass & Malleable Wks., Detroit, Mich.
Detroit Lubricator Co., Detroit, Mich.
Fairbanks Co., New York, N. Y.
●Grinnell Co., Inc., Providence, R. I.
Grove Regulator Co., Oakland, Calif.
Hammond Brass Wks., Hammond, Ind.
●Henry Valve Co., Melrose Park, Ill.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Jarecki Valve Div. of H. K. Porter Co., Inc., Tulsa, Okla.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Klingerit, Inc., New York, N. Y.
Kunkle Valve Co., Ft. Wayne, Ind.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
●Marsh Corp., Jas. P., Skokie, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
Morse-Smith-Morse, Inc., Watertown, Mass.
●Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
OPW Corp., Cincinnati, O.
●Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Ostlind Valve, Inc., Portland, Ore.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Scott Valve Mfg. Co., Detroit, Mich.
Stockham Valves & Fittings, Birmingham, Ala.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Walworth Co., New York, N. Y.
White Flomatic Corp., Hoosick Falls, N. Y.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, GLOBE, IRON BODY

Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadephia, Pa.
●Crane Co., Chicago, Ill.
●Fairbanks Co., New York, N. Y.
●Frick Co., Waynesboro, Pa.
●Grinnell Co., Inc., Providence, R. I.
●Henry Valve Co., Melrose Park, Ill.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Klingerit, Inc., New York, N. Y.
Kunkle Valve Co., Ft. Wayne, Ind.
Lunkenheimer Co., Cincinnati, O.
Ohio Injector Co., Wadsworth, O.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Scott Valve Mfg. Co., Detroit, Mich.
Shank Co., Cyrus, Chicago, Ill.
Stockham Valves & Fittings, Birmingham, Ala.
●Walworth Co., New York, N. Y.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, GLOBE, MALLEABLE IRON

●Crane Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.
●Walworth Co., New York, N. Y.

VALVES, GLOBE, STEEL

Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
●Crane Co., Chicago, Ill.
De Zurik Shower Co., Sartell, Minn.
Edward Valves, Inc., East Chicago, Ind.
Grove Regulator Co., Oakland, Calif.
●Henry Valve Co., Melrose Park, Ill.
●Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Klingerit, Inc., New York, N. Y.
Kunkle Valve Co., Ft. Wayne, Ind.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.

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Ohio Injector Co., Wadsworth, O.
Ostlind Valve, Inc., Portland, Ore.
Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Shank Co., Cyrus, Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J.

VALVES, INSTRUMENT

Bristol Co., The, Waterbury, Conn.
Edward Valves, Inc., East Chicago, Ind.
Hills-McCanna Co., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
Penberthy Injector Co., Detroit, Mich.
Watts Regulator Co., Lawrence, Mass.

VALVES, LINED

American Hard Rubber Co., New York, N. Y. (Rubber lined)
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Conoflow Corp., Philadelphia, Pa.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
De Zurik Shower Co., Sartell, Minn.
Division Lead Co., Chicago, Ill.
Federated Metals Div., American Smelting & Refining Co., New York, N. Y.
●General Controls Co., Glendale, Calif.
Goodrich Co., B. F., Akron, O. (Rubber lined)
●Grinnell Co., Inc., Providence, R. I.
Grove Regulator Co., Oakland, Calif.
Hasco Valve & Machine Co., Milwaukee, Wis. (Rubber)
Hills-McCanna Co., Chicago, Ill.
Lead Lined Iron Pipe Co., Wakefield, Mass. (Lead lined)
National Lead Co., New York, N. Y. (Lead)
Paul Valve Corp., New York, N. Y.
R-S Products Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Passaic, N. J. (Rubber)
Resisto Pipe & Valve Co., East Cambridge, Mass. (Lead)
United States Rubber Co., New York, N. Y.
United States Stoneware Co., New York, N. Y.

VALVES, MIXING, HOT AND COLD WATER

Bailey Co., Chas. M., San Francisco, Calif.
●Bell & Gossett Co., Morton Grove, Ill.
●Crane Co., Chicago, Ill.
●Dole Valve Co., The, Chicago, Ill.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
General Fittings Co., Providence, R. I.
Holby Valve Co., New York, N. Y.
Lawler Automatic Controls, Inc., Mount Vernon, N. Y.
Leonard Valve Co., Cranston, R. I.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
●Powers Regulator Co., Chicago, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
●Taco Heaters, Inc., Providence, R. I.
Vapor Heating Corp., Chicago, Ill.
Watts Regulator Co., Lawrenceville, Mass.
●Webster & Co., Warren, Camden, N. J.
Yula Water Heaters Inc., New York, N. Y.

VALVES, MIXING, STEAM AND WATER

Central Brass Mfg. Co., Cleveland, O.
Cooper Co., Clark, Palmyra, N. J.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
Hammel-Dahl Co., Providence, R. I.
●Johnson Service Co., Milwaukee, Wis.
Leonard Valve Co., Cranston, R. I.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.
●Powers Regulator Co., Chicago, Ill.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls Inc., New York, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.

VALVES, MOTOR OPERATED

Autempco Corp., New York, N. Y.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Bailey Co., Chas. M., San Francisco, Calif.
Barber-Colman Co., Rockford, Ill.
Barksdale Valves, Los Angeles, Calif.
●Bell & Gossett Co., Morton Grove, Ill.
Bristol Co., The, Waterbury, Conn.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Cochrane Corp., Philadelphia, Pa.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Cutler-Hammer, Inc., Milwaukee, Wis.
Darling Valve & Mfg. Co., Williamsport, Pa.
Davis Regulator Co., Chicago, Ill.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Eddy Valve Co., Waterford, N. Y.
Edward Valves, Inc., East Chicago, Ind.
Fischer & Porter Co., Hatboro, Pa.
Foxboro Co., Foxboro, Mass.
●General Controls Co., Glendale, Calif.
Hasco Valve & Machine Co., Milwaukee, Wis.
Hills-McCanna Co., Chicago, Ill.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Homestead Valve Mfg. Co., Coraopolis, Pa.
●Illinois Engineering Co., Chicago, Ill.
J O Mfg. Co., South Gate, Calif.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kieley & Mueller, Inc., North Bergen, N. J.
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Mason-Neilan Regulator Co., Boston, Mass.
●Mercoid Corp., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Nordstrom Valve Div., Rockwell Mfg. Co., Pittsburgh, Pa.
North American Mfg. Co., Cleveland, O.
Paul Valve Corp., New York, N. Y.
●Penn Electric Switch Co., Goshen, Ind.
Philadelphia Gear Works, Inc., Philadelphia, Pa.
Powell Co., Wm., Cincinnati, O.
R-S Products Corp., Philadelphia, Pa.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Reusselaer Valve Co., Cohoes, N. Y.
Rockwell Co., W. S., Fairfield, Conn.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Stockham Valves & Fittings, Birmingham, Ala.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Vogt Machine Co., Henry, Louisville, Ky.
●Walworth Co., New York, N. Y.
●Webster & Co., Warren, Camden, N. J.
Whittaker Co., Wm. R., Los Angeles, Calif.

VALVES, NEEDLE

A-P Controls Corp., Milwaukee, Wis. (Oil)
Alloy Steel Products Co., Linden, N. J. (Stainless steel)
Carpenter Mfg. Corp., The, Cleveland, O. (Stainless steel stem, brass bar stock body)
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
Cooper Alloy Foundry Co., The, Hillside, N. J.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
Detroit Brass & Malleable Wks., Detroit, Mich.
Detroit Lubricator Co., Detroit, Mich.
Edward Valves, Inc., East Chicago, Ind.
●Fairbanks Co., New York, N. Y.
Grove Regulator Co., Oakland, Calif.
Hammel-Dahl Co., Providence, R. I.
●Henry Valve Co., Melrose Park, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lancaster Heat Transfer Co., Inc., Brooklyn, N. Y.
Lunkenheimer Co., Cincinnati, O.
●Maid-O'-Mist, Inc., Chicago, Ill.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Morrison Brothers Co., Dubuque, Ia.
Norgren Co., C. A., Denver, Colo.
●Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Patrol Valve Co., The, Cleveland, O.
Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Shank Co., Cyrus, Chicago, Ill.
Stockham Valves & Fittings, Birmingham, Ala.
Strong, Carlisle & Hammond Co., Cleveland, O.
Swift Lubricator Co., Elmira, N. Y.

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●Taylor Instrument Companies, Rochester, N. Y.
Vacuum-Electronic Engineering Co., Brooklyn, N. Y.
●Walworth Co., New York, N. Y.
Watson-Stillman Co., Roselle, N. J. (Hydraulic service)
Weatherhead Co., The, Cleveland, O.
Webster Electric Co., Racine, Wis. (Pressure regulating valve for oil burners)
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, PLASTIC

Haveg Corp., Newark, Del.

VALVES, PLUG

Altens Foundry & Machine Works, Inc., Lancaster, O.
American Car & Foundry Co., New York, N. Y.
Andale Co., Philadelphia, Pa.
Barrett, Haentjens & Co., Hazleton, Pa.
Barrett Machine Co., Pittsburgh, Pa.
Belfield Valve, Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Bordo Co., Inc., L. J., Glenside, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Cooper Alloy Foundry Co., The, Hillside, N. J.
Cooper Co., Clark, Palmyra, N. J.
Couplings Co., Chicago, Ill.
●Crane Co., Chicago, Ill.
De Zurik Shower Co., Sartell, Minn. (rubber faced)
Duriron Co., Inc., Dayton, O. (Acid resisting)
Eddy Valve Co., Waterford, N. Y.
Edward Valves, Inc., East Chicago, Ind.
●Fairbanks Co., New York, N. Y.
General Ceramics & Steatite Corp., Keasbey, N. J. (Chemical stoneware & porcelain)
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Hamer Oil Tool Co., Long Beach, Calif.
Hasco Valve & Machine Co., Milwaukee, Wis.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., Tulsa, Okla.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Hydro-Aire, Inc., Burbank, Calif.
Imperial Brass Mfg. Co., Chicago, Ill.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Klingerit, Inc., New York, N. Y.
Knight, Maurice A., Akron, O. (Stoneware)
Ludlow Valve Mfg. Co., Inc., Troy, N. Y.
Lunkenheimer Co., Cincinnati, O.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
Mueller Co., Decatur, Ill.
National Airoil Burner Co., Inc., Philadelphia, Pa.
Nordstrom Valve Div., Rockwell Mfg. Co., Pittsburgh, Pa. (Lubricated)
Ohio Injector Co., Wadsworth, O.
Ostlind Valve, Inc., Portland, Ore.
Parks-Cramer Co., Fitchburg, Mass. (jacketed)
Pittsburgh Brass Mfg. Co., Pittsburgh, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Powell Co., Wm., Cincinnati, O.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Stockham Valves & Fittings, Birmingham, Ala.
●Taylor Instrument Companies, Rochester, N. Y.
Tri-Clover Machine Co., Kenosha, Wis.
●Walworth Co., New York, N. Y.
Weatherhead Co., The, Cleveland, O.
Wedgeplug Valve Co., Inc., New Orleans, La.
Welsbach Corp., The, Kitson Div., Philadelphia, Pa.
Whittaker Co., Wm. R., Los Angeles, Calif.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, PRESSURE REDUCING AND REGULATING, AIR AND GAS

Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Bellows Co., Akron, O.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Boylston Steam Specialty Co., Chicago, Ill.
CCA Products, Inc., Glendale, Calif.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Central Brass Mfg. Co., Cleveland, O.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Clark Mfg. Co., Cleveland, O.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Davis Regulator Co., Chicago, Ill.
Defender Instrument & Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
DeVilbiss Co., The, Toledo, O.
Dockson Corp., Detroit, Mich.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Electric Sprayit Co., The, Sheboygan, Wis.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
●General Controls Co., Glendale, Calif.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Gold Top Heating, Inc., Butte, Mont.
Grove Regulator Co., Oakland, Calif.
Hagan Corp., Pittsburgh, Pa.
Hammel-Dahl Co., Providence, R. I.
Harris Calorific Co., The, Cleveland, O.
●Hoffman Specialty Co., Indianapolis, Ind.
Hubbell Corp., Mundelein, Ill.
●Illinois Engineering Co., Chicago, Ill.
Kaye & MacDonald, Inc., West Orange, N. J.
Keckley Co., O. C., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Liquid Carbonic Corp., The, Chicago, Ill.
Locke Regulator Co., Salem, Mass.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Modern Engineering Co., St. Louis, Mo.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
National Cylinder Gas Co., Chicago, Ill.
Norgren Co., C. A., Denver, Colo.
Northern Equipment Div., Continental Foundry & Machine Co., Erie, Pa.
Norwalk Valve Co., South Norwalk, Conn.
●Penn Electric Switch Co., Goshen, Ind.
●Powers Regulator Co., Chicago, Ill.
Roberts-Gordon Appliance Corp., Buffalo, N. Y.
Ross Valve Mfg. Co., Inc., Troy, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
Skaneateles Mfg. Co., Inc., Syracuse, N. Y.
●Spence Engineering Co., Inc., Walden, N. Y.
Squires Co., C. E., Cleveland, O.
Staples & Pfeiffer, San Francisco, Calif.
Strong, Carlisle & Hammond Co., Cleveland, O.
●Swartwout Co., Cleveland, O.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Taylor Instrument Companies, Rochester, N. Y.
●Thrush & Co., H. A., Peru, Ind.
Trerice Co., H. O., Detroit, Mich.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Tryco Products, Inc., Westfield, Mass.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
Yula Water Heaters, Inc., New York, N. Y.

VALVES, PRESSURE REDUCING AND REGULATING, HOT WATER

Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
●Bell & Gossett Co., Morton Grove, Ill.
Boylston Steam Specialty Co., Chicago, Ill.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
Hammel-Dahl Co., Providence, R. I.
●Hoffman Specialty Co., Indianapolis, Ind.
●Illinois Engineering Co., Chicago, Ill.
Kainer & Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Locke Regulator Co., Salem, Mass.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
●Powers Regulator Co., Chicago, Ill.
Republic Flow Meters Co., Chicago, Ill.
Sall Bros. Co., Rockford, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Schaible Co., The, Cincinnati, O.

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●Spence Engineering Co., Inc., Walden, N .Y.
Stickle Steam Specialties Co., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., Cleveland, O.
●Taco Heaters, Inc., Providence, R. I.
Tagliabue Instruments Div. Weston Electrical Instrument Corp., Newark, N. J.
●Taylor Instrument Companies, Rochester, N. Y.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, LaCrosse, Wis.
Trerice Co., H. O., Detroit, Mich.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
White Flomatic Corp., Hoosick Falls, N. Y.
Yula Water Heaters Inc., New York, N. Y.

VALVES, PRESSURE REDUCING AND REGULATING, STEAM

●American District Steam Co., North Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Bailey Meter Co., Cleveland, O.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Boylston Steam Specialty Co., Chicago, Ill.
Brooke Engineering Co., Inc., Philadelphia, Pa.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Central Brass Mfg. Co., Cleveland, O.
Chaplin-Fulton Mfg. Co., Pittsburgh, Pa.
Clark Mfg. Co., Cleveland, O.
Conoflow Corp., Philadelphia, Pa.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Davis Regulator Co., Chicago, Ill.
Defender Instrument and Regulator Co., St. Louis, Mo.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
●Dunham Co., C. A., Chicago, Ill.
●Eclipse Fuel Engineering Co., Rockford, Ill.
●Fischer Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
●General Controls Co., Glendale, Calif.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
Hagan Corp., Pittsburgh, Pa.
Hammel-Dahl Co., Providence, R. I.
●Hoffman Specialty Co., Indianapolis, Ind.
Hubbell Corp., Mundelein, Ill.
●Illinois Engineering Co., Chicago, Ill.
Kaye & MacDonald, Inc., West Orange, N. J.
Keckley Co., O. C., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
●Leslie Co., Lyndhurst, N. J.
Locke Regulator Co., Salem, Mass.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Mason-Neilan Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Northern Equipment Div., Continental Foundry & Machine Co., Erie, Pa.
●Powers Regulator Co., Chicago, Ill.
Republic Flow Meters Co., Chicago, Ill.
Ross Valve Mfg. Co., Inc., Troy, N. Y.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
●Sarcotherm Controls, Inc., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Shallcross Controls, Inc., Milwaukee, Wis.
●Spence Engineering Co., Inc., Walden, N. Y.
Squires Co., C. E., Cleveland, O.
Staples & Pfeiffer, San Francisco, Calif.
Stickle Steam Specialties Co., Indianapolis, Ind.
Strong, Carlisle & Hammond Co., Cleveland, O.
●Swartwout Co., Cleveland, O.
Tagliabue Corp., C. J., Newark, N. J.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Taylor Instrument Companies, Rochester, N. Y.
Trerice Co., H. O., Detroit, Mich.
Vapor Heating Corp., Chicago, Ill.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.

VALVES, PUMP

Anchor Packing Co., Philadelphia, Pa.
Burrows Mfg. Co., F. A., York, Pa.
Dick Co., Inc., R. & J., Passaic, N. J.
Durabla Mfg. Co., New York, N. Y.
Garlock Packing Co, Palmyra, N. Y.
Goodrich Co., B. F., Akron, O.
Jacuzzi Bros., Inc., Richmond, Calif.
Madden & Co., P. E., Chicago, Ill.
Quaker Rubber Corp., Philadelphia, Pa.
Raybestos-Manhattan, Inc., Passaic, N. J.
Red Jacket Mfg. Co., Davenport, Ia.
United States Rubber Company, New York, N. Y.
Williams Gauge Co., The, Pittsburgh, Pa.

VALVES, RADIATOR, AIR

Anderson Products, Inc., Cambridge, Mass.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
Beaton & Corbin Mfg. Co., Southington, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Chicago Specialty Mfg. Co., Chicago, Ill.
Curtis Automotive Devices, Inc., Dayton, O.
Detroit Lubricator Co., Detroit, Mich.
●Dole Valve Co., The, Chicago, Ill.
G & H Mfg. Co., Philadelphia, Pa.
Gold Top Heating, Inc., Butte, Mont.
Gorton Heating Co., Cranford, N. J.
Heat Timer Corp., New York, N. Y.
●Hoffman Specialty Co., Indianapolis, Ind.
Keeney Mfg. Co., Newington, Conn.
Little Mfg. Co., M. S., Hartford, Conn.
●Maid-O'-Mist, Inc., Chicago, Ill. (Humidifying)
Majot Automatic Machine Co., Inc., East Orange, N. J.
Marks Bros. Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Moreheat Distribution, Inc., Cincinnati, O.
New York Air Valve Corp., Brooklyn, N. Y.
Positive Control Co., The, Cincinnati, O.
●Powers Regulator Co., Chicago, Ill.
Radiator Valve Co. of America, Philadelphia, Pa.
Riggio Co., Frank D., Rutherford, N. J.
Schaible Co., The, Cincinnati, O.
●Taco Heaters, Inc., Providence, R. I.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, RADIATOR, AUTOMATIC TEMPERATURE CONTROL, ELECTRIC

Barber-Colman Co., Rockford, Ill.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
●General Controls Co., Glendale, Calif.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Sarcotherm Controls, Inc., New York, N. Y.
Vapor Heating Corp., Chicago, Ill.

VALVES, RADIATOR, AUTOMATIC TEMPERATURE CONTROL, PNEUMATIC

●Johnson Service Co., Milwaukee, Wis.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Powers Regulator Co., Chicago, Ill.

VALVES, RADIATOR, AUTOMATIC TEMPERATURE CONTROL, SELF-CONTAINED

Farris Engineering Corp., Palisades Park, N. J.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
●General Controls Co., Glendale, Calif.
Majot Automatic Machine Co., Inc., East Orange, N. J.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
●Powers Regulator Co., Chicago, Ill.
Sterling, Inc., Milwaukee, Wis.
●Trane Co., The, LaCrosse, Wis.

VALVES, RADIATOR, ORIFICE

●American District Steam Co., North Tonawanda, N. Y.
●Barnes & Jones, Inc., Boston, Mass.
Cashin Co., W. D., Boston, Mass.
●Dunham Co., C. A., Chicago, Ill.
●Grinnell Co., Inc., Providence, R. I.
●Illinois Engineering Co., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
New York Air Valve Corp., Brooklyn, N. Y.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
●Trane Co., The, LaCrosse, Wis.
●Webster & Co., Warren, Camden, N. J.

VALVES, RADIATOR, STEAM AND HOT WATER, HAND

●Barnes & Jones, Inc., Boston, Mass.
Belknap Mfg. Co., Bridgeport, Conn.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Cashin Co., W. D., Boston, Mass.
Chase Brass & Copper Co., Waterbury, Conn.
●Crane Co., Chicago, Ill.
Detroit Lubricator Co., Detroit, Mich.
●Dunham Co., C. A., Chicago, Ill.

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●Fairbanks Co., New York, N. Y.
Haines & Co., Inc., William S., Div. Sellers Injector Corp., Philadelphia, Pa.
Hammond Brass Wks., Hammond, Ind.
●Hoffman Specialty Co., Indianapolis, Ind.
●Illinois Engineering Co., Chicago, Ill.
●Jenkins Bros., New York, N. Y.
Kennedy Valve Mfg. Co., Elmira, N. Y.
●Marsh Corp., Jas. P., Skokie, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
●Ohio Brass Co., Mansfield, O.
Ohio Injector Co., Wadsworth, O.
Powell Co., Wm., Cincinnati, O.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Schaible Co., The, Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
●Sterling, Inc., Milwaukee, Wis.
●Trane Co., The, La Crosse, Wis.
United States Radiator Corp., Detroit, Mich.
●Webster & Co., Warren, Camden, N. J.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, RADIATOR, STEAM AND HOT WATER, MODULATING

●American District Steam Co., North Tonawanda, N. Y.
●Barnes & Jones, Inc., Boston, Mass.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Cashin Co., W. D., Boston, Mass.
Cryer Trap & Valve Co., Inc., New York, N. Y.
●Dunham Co., C. A., Chicago, Ill.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.
Haines & Co., Inc., William S., Div. Sellers Injector Corp., Philadelphia, Pa.
●Hoffman Specialty Co., Indianapolis, Ind.
●Illinois Engineering Co., Chicago, Ill.
●Jenkins Bros., New York, N. Y.
Johnson Service Co., Milwaukee, Wis.
●Marsh Corp., Jas. P., Skokie, Ill.
Marsh Valve Co., Dunkirk, N. Y.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Mouat Vapor Heating Co., The, Cleveland, O.
●Ohio Brass Co., Mansfield, O.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
●Sterling, Inc., Milwaukee, Wis.
Tallmadge, Systems, Webster, Div. of Hoffman Specialty Co., Indianapolis, Ind.
Vapor Specialty Co., New York, N. Y.
●Webster & Co., Warren, Camden, N. J.

VALVES, REFRIGERATION (ANGLE, CHECK, GATE, GLOBE, NEEDLE, RELIEF)

Baker Refrigeration Corp., South Windham, Me.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Central Brass Mfg. Co., Cleveland, O.
●Crane Co., Chicago, Ill.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Detroit Stamping Co., Detroit, Mich.
●Frick Co., Waynesboro, Pa.
Hammel-Dahl Co., Providence, R. I.
●Henry Valve Co., Melrose Park, Ill.
Hubbell Corp., Mundelein, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
●Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
●Mueller Brass Co., Port Huron, Mich.
Reynolds Mfg. Co., Inc., Springfield, Mo.
Shank Co., Cyrus, Chicago, Ill.
Superior Valve and Fittings Co., Pittsburgh, Pa.
Techniflex Corp., Port Jervis, N. Y.
Vilter Mfg. Co., Milwaukee, Wis.
Vogt Machine Co., Henry, Louisville, Ky.
Weatherhead Co., Cleveland, O.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

VALVES, REFRIGERATION, BACK PRESSURE

A-P Controls Corp., Milwaukee, Wis.
●Alco Valve Co., St. Louis, Mo.
Aminco Refrigeration Products Co., Detroit, Mich.
Bailey Co., Chas. M., San Francisco, Calif.
Baker Refrigeration Corp., South Windham, Me.
●Cash Co., A. W., Decatur, Ill.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Electrimatic Co., Sales Affiliate, Jas. P. Marsh Corp., Skokie, Ill.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
Frigidaire Div., General Motors Corp., Dayton, O.
●General Controls Co., Glendale, Calif.
Hammel-Dahl Co., Providence, R. I.
Hubbell Corp., Mundelein, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Lonergan Co., J. E., Philadelphia, Pa.
●Marsh Corp., Jas. P., Skokie, Ill.
●Mueller Brass Co., Port Huron, Mich.
●Schnacke, Inc., Evansville, Ind.
Temprite Products Corp., Birmingham, Mich.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

VALVES, REFRIGERATION, EXPANSION, CONSTANT PRESSURE

A-P Controls Corp., Milwaukee, Wis.
●Alco Valve Co., St. Louis, Mo.
Aminco Refrigeration Products Co., Detroit, Mich.
Baker Refrigeration Corp., South Windham, Me.
●Cash Co., A. W., Decatur, Ill.
●Crane Co., Chicago, Ill.
Detroit Lubricator Co., Detroit, Mich.
Foster Engineering Co., Union, N. J.
Frigidaire Div., General Motors Corp., Dayton, O.
●General Controls Co., Glendale, Calif.
Hammel-Dahl Co., Providence, R. I.
Hubbell Corp., Mundelein, Ill.
Lonergan Co., J. E., Philadelphia, Pa.
Mayson Mfg. Co., Detroit, Mich.
Tenney Engineering, Inc., Newark, N. J.
X L Refrigerating Co., Chicago, Ill.
York Corp., York, Pa.

VALVES, REFRIGERATION, EXPANSION, THERMOSTATIC

A-P Controls Corp., Milwaukee, Wis.
●Alco Valve Co., St. Louis, Mo.
Cutler-Hammer Inc., Milwaukee, Wis.
Detroit Lubricator Co., Detroit, Mich.
Frigidaire Div., General Motors Corp., Dayton, O.
●General Controls Co., Glendale, Calif.
Mayson Mfg. Co., Detroit, Mich.
Peerless of America, Inc., Chicago, Ill.
●Sporlan Valve Co., St. Louis, Mo.
Tenney Engineering, Inc., Newark, N. J.
X L Refrigerating Co., Chicago, Ill.

VALVES, REFRIGERATION, FLOAT, HIGH PRESSURE

●Alco Valve Co., St. Louis, Mo.
Aminco Refrigeration Products Co., Detroit, Mich.
Foster Engineering Co., Union, N. J.
●Frick Co., Waynesboro, Pa.
Hubbell Corp., Mundelein, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Mercoid Corp., Chicago, Ill.
Phillips & Co., H. A., Chicago, Ill.
Temprite Products Corp., Birmingham, Mich.
Vilter Mfg. Co, Milwaukee, Wis.
Wabash Mfg. Co., Chicago, Ill.
●Worthington Pump & Machinery Corp., Air Conditioning and Refrigeration Div., Harrison, N. J.
York Corp., York, Pa.

VALVES, REFRIGERATION, FLOAT, HIGH PRESSURE AND LOW PRESSURE

Aminco Refrigeration Products Co., Detroit, Mich.
Mayson Mfg. Co., Detroit, Mich.
Temprite Products Corp., Birmingham, Mich.
Vilter Mfg. Co., Milwaukee, Wis.
Voss Co., J. H. H., Inc., New York, N. Y.
York Corp., York, Pa.

VALVES, REFRIGERATION, LIQUID CONTROL, FLOAT PILOTED

●Alco Valve Co., St. Louis, Mo.
Cooper Co., Clark, Palmyra, N. J.
●Frick Co., Waynesboro, Pa.
●Maid-O'-Mist, Inc., Chicago, Ill.
Phillips & Co., H. A., Chicago, Ill.
York Corp., York, Pa.

VALVES, REFRIGERATION, MAGNETIC STOP

A-P Controls Corp., Milwaukee, Wis.
●Alco Valve Co., St. Louis, Mo.
●Automatic Switch Co., Orange, N. J.
Detroit Lubricator Co., Detroit, Mich.
●Frick Co., Waynesboro, Pa.
●General Controls Co., Glendale, Calif.

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Hubbell Corp., Mundelein, Ill.
●Marsh Corp., Jas. P., Skokie, Ill.
●Mercoid Corp., Chicago, Ill.
●Penn Electric Switch Co., Goshen, Ind.
Skinner Electric Valve Div., Norwalk, Conn.
●Sporlan Valve Co., St. Louis, Mo.

VALVES, REFRIGERATION, TEMPERATURE REGULATING OR SNAP ACTION SUCTION

●Alco Valve Co., St. Louis, Mo.
Frigidaire Div., General Motors Corp., Dayton, O.

VALVES, REFRIGERATION, WATER REGULATING, PRESSURE OR TEMPERATURE ACTUATED

A-P Controls Corp., Milwaukee, Wis.
Aminco Refrigeration Products Co., Detroit, Mich.
Art Valve Co., Chicago, Ill.
Bailey Co., Chas. M., San Francisco, Calif.
●Cash Co., A. W., Decatur, Ill.
Cooper Co., Clark, Palmyra, N. J.
Electrimatic Co., Sales Affiliate, Jas. P. Marsh Corp., Skokie, Ill.
Farris Engineering Corp., Palisades Park, N. J.
●Fisher Governor Co., Marshalltown, Ia.
Foster Engineering Co., Union, N. J.
Frigidaire Div., General Motors Corp., Dayton, O.
Hubbell Corp., Mundelein, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
Klipfel Mfg. Co., Hamilton, O.
Madden Brass Products Co., The, Chicago, Ill.
●Marsh Corp., Jas. P., Skokie, Ill.
Mayson Mfg. Co., Detroit, Mich.
●Mercoid Corp., Chicago, Ill.
●Penn Electric Switch Co., Goshen, Ind.
Perfection Refrigeration Parts Co., Harvey, Ill.
●Sarco Co., Inc., New York, N. Y.
Shank Co., Cyrus, Chicago, Ill.
●Spence Engineering Co., Inc., Walden, N. Y.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
York Corp., York, Pa.

VALVES, RELIEF, HOT WATER, COMBINED PRESSURE AND TEMPERATURE OPERATED

Beaton & Cadwell Mfg. Co., New Britain, Conn.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Cooper Co., Clark, Palmyra, N. J.
●Fisher Govenor Co., Marshalltown, Ia.
Kainer & Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
Patrol Valve Co., The, Cleveland, O.
Sall Bros. Co., Rockford, Ill.
Schaible Co., The, Cincinnati, O.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
●Thrush & Co., H. A. Peru, Ind.
●Trane Co., The, La Crosse, Wis.
Watts Regulator Co., Lawrence, Mass.
Welsbach Corp., The, Kitson Div., Philadelphia, Pa.

VALVES, RELIEF, HOT WATER, PRESSURE OPERATED

Ashton Valve Co., Wrentham, Mass.
Bailey Co., Chas. M., San Francisco, Calif.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
●Bell & Gossett Co., Morton Grove, Ill.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Central Brass Mfg. Co., Cleveland, O.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Davis Regulator Co., Chicago, Ill.
d'Este Div., Kaye & MacDonald, Inc., West Orange, N. J.
Durabla Mfg. Co., New York, N. Y.
Eddy Valve Co., Waterford, N. Y.
Edward Valves, Inc., East Chicago, Ind.
Farris Engineering Corp., Palisades Park, N. J.
●Fisher Governor Co., Marshalltown, Ia.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Kainer & Co., Chicago, Ill.
Keckley Co., O. C., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
Kunkle Valve Co., Ft. Wayne, Ind.
Lonergan Co., J. E., Philadelphia, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marine & Industrial Products Co., Philadelphia, Pa.
McAlear Mfg. Co., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Mueller Co.; Decatur, Ill.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Patrol Valve Co., The, Cleveland, O.
Ross Valve Mfg. Co., Inc., Troy, N. Y.
Sall Bros. Co., Rockford, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Schaible Co., The, Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Staples & Pfeiffer, San Francisco, Calif.
●Swartwout Co., Cleveland, O.
●Taco Heaters, Inc., Providence, R. I.
Tagliabue Instruments Div., Weston Electrical Instrument Corp., Newark, N. J.
●Thrush & Co., H. A., Peru, Ind.
●Trane Co., The, La Crosse, Wis.
Triplex Heating Specialty Co., Inc., Peru, Ind.
Tryco Products, Inc., Westfield, Mass.
Watson & McDaniel Co., Philadelphia, Pa.
Watts Regulator Co., Lawrence, Mass.
Welsbach Corp., The, Kitson Div., Philadelphia, Pa.

VALVES, RELIEF, HOT WATER, PRESSURE OPERATED, SELF-FILLING

Bailey Co., Chas. M., San Francisco, Calif.
Beaton & Cadwell Mfg. Co., New Britain, Conn.
●Bell & Gossett Co., Morton Grove, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
●Crane Co., Chicago, Ill.
Kehm Corp., The, Chicago, Ill.
Kieley & Mueller, Inc., North Bergen, N. J.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
Mueller Co., Decatur, Ill.
Sall Bros. Co., Rockford, Ill.
●Sarcotherm Controls, Inc., New York, N. Y.
●Thrush & Co., H. A., Peru, Ind.
Watts Regulator Co., Lawrence, Mass.

VALVES, RELIEF, HYDRAULIC

Blackhawk Mfg. Co., Milwaukee, Wis.
Crosby Steam Gage & Valve Co., Wrentham, Mass.
Fulflo Specialties Co., Inc., The, Blanchester, O.
Golden-Anderson Specialty Co., Pittsburgh, Pa.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marine & Industrial Products Co., Philadelphia, Pa.
Pantex Mfg. Corp., Hydraulic Div., Pawtucket, R. I.
Watson-Stillman Co., Roselle, N. J.

VALVES, RELIEF, OIL

Altens Foundry & Machine Works, Inc., Lancaster, O.
Andale Co., Philadelphia, Pa.
Ashton Valve Co., Wrentham, Mass.
Atlas Valve Co., Newark, N. J.
Bailey Co., Chas. M., San Francisco, Calif.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Crosby Steam Gage & Valve Co., Wrentham, Mass.
Davis Regulator Corp., Chicago, Ill.
Durabla Mfg. Co., New York, N. Y.
Edward Valves, Inc., East Chicago, Ind.
Farris Engineering Corp., Palisades Park, N. J.
●Fisher Governor Co., Marshalltown, Ia.
Fulflo Specialties Co., Inc., The, Blanchester, O.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Greer Hydraulics, Inc., Brooklyn, N. Y.
Grove Regulator Co., Oakland, Calif.
Hammel-Dahl Co., Providence, R. I.
Hubbell Corp., Mundelein, Ill.
Keckley Co., O. C., Chicago, Ill.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., Hamilton, O.
Kunkle Valve Co., Ft. Wayne, Ind.
Lancaster Heat Transfer Co., Inc., Brooklyn, N. Y.
Locke Regulator Co., Salem, Mass.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marine & Industrial Products Co., Philadelphia, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Morrison Brothers Co., Dubuque, Ia.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
Pantex Mfg. Corp., Hydraulics Div., Pawtucket, R. I.
Preferred Utilites Mfg. Corp., New York, N. Y.
Schade Valve Mfg. Co., Philadelphia, Pa.
Scott Valve Mfg. Co., Detroit, Mich.
Skinner Electric Valve Div., Norwalk, Conn.
Staples & Pfeiffer, San Francisco, Calif.
Thermix Corp., The, Greenwich, Conn.
Watson & McDaniel Co., Philadelphia, Pa.
Whittaker Co., Wm. R., Los Angeles, Calif.

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VALVES, SADDLE

Beckett & Co., Inc., Thomas, Dallas, Tex.
Darling Valve & Mfg. Co., Williamsport, Pa.
●Fairbanks Co., New York, N. Y.
Imperial Brass Mfg. Co., Chicago, Ill.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
●Maid-O'-Mist, Inc., Chicago, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
Ohio Injector Co., Wadsworth, O.
●Walworth Co., New York, N. Y.

VALVES, SAFETY, STEAM

Ashton Valve Co., Wrentham, Mass.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
Crosby Steam Gage & Valve Co., Wrentham, Mass.
●Eclipse Fuel Engineering Co., Rockford, Ill.
Farris Engineering Corp., Palisades Park, N. J.
Foster Engineering Co., Union, N. J.
Keckley Co., O. C., Chicago, Ill.
Kunkle Valve Co., Ft. Wayne, Ind.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Marine & Industrial Products Co., Philadelphia, Pa.
North American Mfg. Co., Cleveland, O.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

VALVES, SLIDE

Altens Foundry & Machine Works, Inc., Lancaster, O.
Barksdale Valves, Los Angeles, Calif.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
General Ceramics & Steatite Corp., Keasbey, N. J. (chemical stoneware)
J O Mfg. Co., South Gate, Calif.
R-S Products Corp., Philadelphia, Pa.
Rockwell Co., W. S., Fairfield, Conn.
Whittaker Co., Wm. R., Los Angeles, Calif.

VALVES, SOLDER JOINT

American Brass Co., Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Cleveland Brass Mfg. Co., The, Cleveland, O.
●Crane Co., Chicago, Ill.
Darling Valve & Mfg. Co., Williamsport, Pa.
●Fairbanks Co., New York, N. Y. (Silver braze joints)
Hammond Brass Works, Hammond, Ind.
●Henry Valve Co., Melrose Park, Ill.
Hills-McCanna Co., Chicago, Ill.
Imperial Brass Mfg. Co., Chicago, Ill.
●Jenkins Bros., New York, N. Y.
Kerotest Mfg. Co., Pittsburgh, Pa.
●Mueller Brass Co., Port Huron, Mich.
Northern Indiana Brass Co., Elkhart, Ind.
●Ohio Brass Co., Mansfield, O.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
●Walworth Co., New York, N. Y. (Brazed)
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.

VALVES, SOLENOID

●Alco Valve Co., St. Louis, Mo.
Automatic Products Co., Milwaukee, Wis.
●Automatic Switch Co., Orange, N. J.
Barber-Colman Co., Rockford, Ill.
Barksdale Valves, Los Angeles, Calif.
Bellows Co., Akron, O.
Cooper Co., Clark, Palmyra, N. J.
Cutler-Hammer, Inc., Milwaukee, Wis.
Davis Regulator Co., Chicago, Ill.
Detroit Lubricator Co., Detroit, Mich.
Electrimatic Co., Sales Affiliate, Jas. P. Marsh Corp., Skokie, Ill.
Erickson Specialty Co., Cohoes, N. Y.
●Frick Co., Waynesboro, Pa.
●General Controls Co., Glendale, Calif.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Gleason-Avery, Inc., Auburn, N. Y.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
Hasco Valve & Machine Co., Milwaukee, Wis. (alloy)
Hays Mfg. Co., Erie, Pa.
Hook & Ackerman, Inc., New York, N. Y.
Hubbell Corp., Mundelein, Ill.
Hunt & Son, Inc., C. B., Salem, O.
Johnson Corp., The, Three Rivers, Mich.
Keckley Co., O. C., Chicago, Ill.
Lammert & Mann Co., Chicago, Ill. (Gas safety shut-off)
Locke Regulator Co., Salem, Mass.
Lonergan Co., J. E., Philadelphia, Pa.
●Marsh Corp., Jas. P., Skokie, Ill.
●McDonnell & Miller, Inc., Chicago, Ill.
McQuay-Norris Mfg. Co., St. Louis, Mo.
McRae Valve Co., Los Angeles, Calif.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
Northern Equipment Div., Continental Foundry & Machine Co., Erie, Pa.
Paul Valve Corp., New York, N. Y.
●Penn Electric Switch Co., Goshen, Ind.
●Perfex Corp., Milwaukee, Wis.
Pfening Co., Fred D., Columbus, O. (water and steam)
R-S Products Corp., Philadelphia, Pa.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
●Sarco Co., Inc., New York, N. Y.
●Sarcotherm Controls, Inc., New York, N. Y.
Skinner Electric Valve Div., Norwalk, Conn.
●Sporlan Valve Co., St. Louis, Mo.
Square D Co., Industrial Controller Div., Milwaukee, Wis.
Supreme Electric Products Corp., Rochester, N. Y.
Taylor-Winfield Corp., Warren, O.
Vapor Heating Corp., Chicago, Ill.
●White-Rodgers Electric Co., St. Louis, Mo.

VALVES, 2, 3 AND 4 WAY

●Alco Valve Co., St. Louis, Mo.
Altens Foundry & Machine Works, Inc., Lancaster, O.
Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Barber-Colman Co., Rockford, Ill.
Barksdale Valves, Los Angeles, Calif.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.
Bellows Co., Akron, O.
Black-Sivalls & Bryson, Inc., Kansas City, Mo.
Bordo Co., Inc., L. J., Glenside, Pa.
Bristol Co., The, Waterbury, Conn.
●Cash Co., A. W., Decatur, Ill.
Cash Valve Mfg. Co., A. W., Decatur, Ill.
Clark Controller Co., Cleveland, O.
Cooper Co., Clark, Palmyra, N. J.
●Crane Co., Chicago, Ill.
●Davis Engineering Corp., Elizabeth, N. J.
Davis Regulator Co., Chicago, Ill.
Detroit Brass & Malleable Works, Detroit, Mich.
Detroit Lubricator Co., Detroit, Mich.
De Zurik Shower Co., Sartell, Minn.
Duriron Co., Inc., The, Dayton, O. (acid resisting)
●Fisher Governor Co., Marshalltown, Ia.
●General Controls Co., Glendale, Calif.
Golden-Anderson Valve Specialty Co., Pittsburgh, Pa.
Grove Regulator Co., Oakland, Calif.
Hammel-Dahl Co., Providence, R. I.
●Henry Valve Co., Melrose Park, Ill.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Hunt & Son, Inc., C. B., Salem, O.
Hydro-Aire, Inc., Burbank, Calif.
Imperial Brass Mfg. Co., Chicago, Ill.
●Johnson Service Co., Milwaukee, Wis.
Keller Tool Co., Grand Haven, Mich.
Kerotest Mfg. Co., Pittsburgh, Pa.
Lawler Automatic Controls, Inc., Mount Vernon, N. Y.
Lonergan Co., J. E., Philadelphia, Pa.
Lunkenheimer Co., Cincinnati, O.
Luzerne Rubber Co., Trenton, N. J. (Hard rubber)
●Mercoid Corp., Chicago, Ill.
●Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Mueller Steam Specialty Co., Inc., Long Island City, N. Y.
●Nicholson & Co., W. H., Wilkes-Barre, Pa.
Nordstrom Valve Div., Rockwell Mfg. Co., Pittsburgh, Pa.
●Penn Electric Switch Co., Goshen, Ind.
Powell Co., Wm., Cincinnati, O.
●Powers Regulator Co., Chicago, Ill.
R-S Products Corp., Philadelphia, Pa.
●R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Rockwell Co., W. S., Fairfeld, Conn.
Ruggles-Klingemann Mfg. Co., Boston, Mass.
●Sarcotherm Controls, Inc., New York, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Shank Co., Cyrus, Chicago, Ill.
Skinner Electric Valve Div., Norwalk, Conn.
●Spence Engineering Co., Inc., Walden, N. Y.
●Taylor Instrument Companies, Rochester, N. Y.
Taylor-Winfield Corp., Warren, O.
●Walworth Co., New York, N. Y. (Lubricated plug valves)
Watson-Stillman Co., Roselle, N. J. (Hydraulic service)
Weatherhead Co., The, Cleveland, O.
Williams Valve Co., D. T., Div. of The Schaible Co., Cincinnati, O.
Whittaker Co., Wm. R., Los Angeles, Calif.

VANES, DUCT TURNING, PREFABRICATED

●Anemostat Corp. of America, New York, N. Y. (Equalizing deflectors)
Barber-Colman Co., Rockford, Ill.
Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Goettl Bros. Metal Prod. Inc., Phoenix, Ariz.
●Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
●Titus Mfg. Corp., Waterloo, Ia.
●Tuttle & Bailey, Inc., New Britain, Conn.

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VAPOR HEATING SYSTEMS

See Systems, Heating, Vapor

VARIABLE SPEED DRIVES

See Changers, Speed, Hydraulic Coupling; Changers, Speed, Mechanical; Reducers, Speed; Pulleys and Sheaves, for Belt Drives

VARIABLE SPEED PULLEYS

See Changers, Speed, Mechanical

V-BELT DRIVES

See Drives, V-Belt

VELOCITY REGULATORS

See Regulators, Air Velocity

VENT FLUE CAPS

See Caps, Vent Flue

VENTILATING HOSE

See Ducts and Duct Fittings, Prefabricated, Non-Metallic

VENTILATION HEATERS

See Surface, Finned, Heating; Ventilators, Roof, Fan; Ventilators, Unit

VENTILATORS, MUSHROOM

Chicago Blower Corp., Chicago, Ill.
●De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Dickinson, Aeolus, Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Knight, Maurice A., Akron, O. (Stoneware)
Knowles Mushroom Ventilator Co., Upper Montclair, N. J.
Lumm Co., A. H., Toledo, O.
Penn Ventilating Co., Philadelphia, Pa.
Van Noorden Co., E., Boston, Mass.
Ventilating Products Co., Chicago, Ill.

VENTILATORS, ROOF, FAN

Aerovent Fan Co., Inc., Piqua, O.
Air Controls, Inc., Div. of Cleveland Heater Co., Cleveland, O.
Airecon Industries, Detroit, Mich.
Allen Ventilator Div., Production Planning Co., Rochester, Minn.
American Coolair Corp., Jacksonville, Fla.
American-Larson Ventilation Co., Pittsburgh, Pa.
American Steel Band Co., Pittsburgh, Pa.
Ammerman Co., C. L., Minneapolis, Minn.
Arex Co., Chicago, Ill.
Bar-Brook Mfg. Co., Inc., Shreveport, La.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Breidert Co., G. C., Los Angeles, Calif.
Burt Mfg. Co., Akron, O.
Century Fan & Ventilator Co., Stamford, Conn.
Chelsea Fan & Blower Co., Inc., Plainfield, N. J.
Chicago Blower Corp., Chicago, Ill.
Clay Equipment Corp., Cedar Falls, Ia.
Dana Fan & Blower Corp., Cincinnati, O.
Davidson Hy Duty Roof Fan Co., Newton, Mass.
●De Bothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Dickinson, Aeolus, Chicago, Ill.
Diehl Mfg. Co., Somerville, N. J.
Electrovent Fan & Mfg. Co., Chicago, Ill.
Empire Ventilation Equipment Co., Long Island City, N. Y.
Fingles Co., The, Baltimore, Md.
●Gallaher Co., The, Owatonna, Minn., & Omaha, Neb.
Gehri Co., Tacoma, Wash.
●General Blower Co., Morton Grove, Ill.
Hartzell Propeller Fan Co., Piqua, O.
Hirschman-Pohle Co., Inc., LeRoy, N. Y.
Howes-Woods Co., Cambridge, Mass.
Ilg Electric Ventilating Co., Chicago, Ill.
International Engineering, Inc., Dayton, O.
Iona Ventilator Co., Inc., Philadelphia, Pa.
Iron Lung Ventilator Co., Cleveland, O.
Jeffrey Mfg. Co., Columbus, O.
●Jenn Air Products Co., Indianapolis, Ind.
Jordan & Co., Inc., Paul R., Indianapolis, Ind.
Kernchen Co., Chicago, Ill.
King Co., The, Owatonna, Minn.
Lee & Son Co., Thomas, Cincinnati, O.
Lumm Co., A. H., Toledo, O.
Martin Fan & Blower Co., Chicago, Ill.
Mellish & Murray Co., Chicago, Ill.
Mountain States Equipment Co., Denver, Colo.
●Muckle Mfg. Co., Owatonna, Minn.
Myers Electric Co., Inc., Pittsburgh, Pa.
●New York Blower Co., Chicago, Ill.
Newcomb-Detroit Co., Detroit, Mich.
Octagon Ventilator Co., Chicago, Ill.
Paasche Airbrush Co., Chicago, Ill.
Peerless Electric Co., Warren, O.
Penn Ventilating Co., Philadelphia, Pa.
Phoenix Ventilator Co., Inc., Brooklyn, N. Y.
●Propellair Div., Robbins & Myers Inc., Springfield, O.
Robertson Co., H. H., Pittsburgh, Pa.
Royal Ventilator Co., Philadelphia, Pa.
Schwitzer-Cummins Co., Indianapolis, Ind.
Somers, Inc., H. J., Detroit, Mich.
●South Bend Air Products, Inc., South Bend, Ind.
●Swartwout Co., Cleveland, O.
Trade-Wind Motorfans, Inc., Los Angeles, Calif.
●Trane Co., The, La Crosse, Wis.
Truflo Fan Co., Harmony, Pa.
Uno Ventilator Co., Cliftondale, Mass.
Utility Appliance Corp., Los Angeles, Calif.
Van Noorden Co., E., Boston, Mass.
Washburne & Co., E. G., New York, N. Y.
Waverly Heating Supply Co., Boston, Mass.
●Western Engineering & Mfg. Co., Los Angeles, Calif.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Wind-Way Fan & Ventilator Co., New Orleans, La.
●Wing Mfg. Co., L. J., Linden, N. J.
Winkler & Sons, Inc., A. E., Milwaukee, Wis.

VENTILATORS, ROOF, GRAVITY

Accurate Sheet Metal Mfg. Works, Chicago, Ill.
Air Control Products, Inc., Coopersville, Mich.
●Air Devices, Inc., New York, N. Y.
Airecon Industries, Detroit, Mich.
Airjet Ventilator Co., Pasadena, Calif.
Ajax Furnace Fitting Co., Div. of Cincinnati Sheet Metal & Roofing Co., Cincinnati, O.
Allen Ventilator Div., Production Planning Co., Rochester, Mich.
American-Larson Ventilation Co., Pittsburgh, Pa.
American Sheet Metal Works, New Orleans, La.
American Steel Band Co., Pittsburgh, Pa.
Ammerman Co., C. L., Minneapolis, Minn.
Arex Co., Chicago, Ill.
Autoforce Ventilating System, Boston, Mass.
Breidert Co., G. C., Los Angeles, Calif.
Burt Mfg. Co., Akron, O.
Century Fan & Ventilator Co., Stamford, Conn.
Clay Equipment Corp., Cedar Falls, Ia.
Danzer Metal Works Co., Hagerstown, Md.
Day Co., The, Minneapolis, Minn.
Dickinson, Aeolus, Chicago, Ill.
Empire Ventilation Equipment Co., Long Island City, N. Y.
Fingles Co., The, Baltimore, Md.
Gehri Co., Tacoma, Wash.
Goettl Bros. Metal Prod. Inc., Phoenix, Ariz.
Hirschman-Pohle Co., Inc., LeRoy, N. Y.
Howes-Woods Co., Cambridge, Mass.
Inland Steel Products Co., Milwaukee, Wis.
Iona Ventilator Co., Inc., Philadelphia, Pa.
Iwan Brothers, South Bend, Ind.
Jordan & Co., Inc., Paul R., Indianapolis, Ind.
Kernchen Co., Chicago, Ill.
King Co., The, Owatonna, Minn.
Klauer Mfg. Co., Dubuque, Ia.
Kleenaire Corp., Stevens Point, Wis.
La Crosse Steel Roofing & Corrugating Co., La Crosse, Wis.
Lee & Son Co., Thomas, Cincinnati, O.
Levow, David, New York, N. Y.
Lumm Co., A. H., Toledo, O.
Lyon, Conklin & Co., Inc., Baltimore, Md.
Mellish & Murray Co., Chicago, Ill.
Moeschl-Edwards Corrugating Co., Inc., The, Cincinnati, O.
National Metal Fabricators, Chicago, Ill.
Newcomb-Detroit Co., Detroit, Mich.
Octagon Ventilator Co., Chicago, Ill.
Patten Co., J. V., Sycamore, Ill.
Penn Ventilating Co., Philadelphia, Pa.
Phoenix Ventilator Co., Inc., Brooklyn, N. Y.
Pioneer Roofing & Sheet Metal Co., Muskogee, Okla.
Plasteel Products Co., Washington, Pa.
Puhl & Hepper Mfg. Co., Inc., St. Louis, Mo.
Riggin Metal Products, Inc., Kankakee, Ill.
Robertson Co., H. H., Pittsburgh, Pa.
Royal Ventilator Co., Philadelphia, Pa.
St. Paul Corrugating Co., St. Paul, Minn.
Sioux Steel Co., Sioux Falls, S. D.
Southbridge Roofing Co., Inc., Southbridge, Mass.
Souther Iron Co., E. E., St. Louis, Mo.
Southern States Iron Roofing Co., Savannah, Ga.
Standard Furnace Supply Co., Omaha, Neb.
Standard Ventilator Co., Lewisburg, Pa.
●Swartwout Co., Cleveland, O.
Tierney Rotor Ventilator Co., Minneapolis, Minn.
Tiffin Eaves Trough Co., Tiffin, O.
Uno Ventilator Co., Cliftondale, Mass.
Van Noorden Co., E., Boston, Mass.
Walker Jamar Co., Duluth, Minn.
Warner Ventilator Co., La Grange, Ind.
●Western Engineering & Mfg. Co., Los Angeles, Calif.
Willis Steel Corp., Galesburg, Ill.
Winkler & Sons, Inc., A. E., Milwaukee, Wis.
York Corrugating Co., York, Pa.

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VENTILATORS, UNIT

●American Blower Corp., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
Gannon Co., Russell R., Co., Inc., The, Cincinnati, O.
●Nelson Herman Div., American Air Filter Co., Inc., Moline, Ill.
●Nesbitt, Inc., John J., Philadelphia, Pa.
Peerless Unit Ventilation Co., Inc., Bridgeport, Conn.
●Trane Co., The, LaCrosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

VIBRATION ABSORBERS

See Absorbers, Vibration

VIBRATION ELIMINATORS

See Absorbers, Vibration; Bases and Pads, Vibration Isolating; Hose, Metal and Fittings

VIBRATION ISOLATORS

See Absorbers, Vibration; Bases and Pads, Vibration Isolating; Hose, Metal and Fittings

VISCOSIMETERS

American Instrument Co., Silver Spring, Md.
Brabender Corp., Rochelle Park, N. J.
Bristol Co., The, Waterbury, Conn.
Brookfield Engineering Laboratories, Inc., Stoughton, Mass.
Daigger & Co., A., Chicago, Ill.
Fischer & Porter Co., Hatboro, Pa.
Fish-Schurman Corp., New York, N. Y.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Giannini & Co., Inc., G. M., Pasadena, Calif.
Greiner Co., Emil, New York, N. Y.
Humboldt Mfg. Co., Chicago, Ill.
Precision Scientific Co., Chicago, Ill.
Scientific Instrument Co., Detroit, Mich.
Thomas Co., Arthur H., Philadelphia, Pa.
Will Corp., Rochester, N. Y.

VISCOUS LIQUID PUMPS

See Pumps, Viscous Liquids

VISES, PIPE

American Pipe Tool Co., Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Beaver Pipe Tools, Inc., Warren, O. (Sawing—for tubing)
Billings & Spencer Co., Hartford, Conn.
Capewell Mfg. Co., Hartford, Conn.
Crown Die & Tool Co., Chicago, Ill.
Desmond-Stephens Mfg. Co., Urbana, O.
Erie Tool Wks., Erie, Pa.
Hollands Mfg. Co., Erie, Pa.
Munton Mfg. Co., Franklin Park, Ill.
Nye Tool Co., Chicago, Ill.
●Ridge Tool Co., Elyria, O.
Sac Tool Mfg. Co., St. Louis, Mo.
Toledo Pipe Threading Machine Co., Toledo, O.
Trimont Mfg. Co., Div. of Aetna Industrial Corp., Boston, Mass.
Vanderman Mfg. Co., Willimantic, Conn.
Williams & Co., J. H., Buffalo, N. Y.
Yost Mfg. Co., Meadville, Pa.

VISE STANDS

See Stands, Pipe Vise

WALL THERMOSTATS

See Thermostats, Room or Wall

WARM AIR FURNACES

See Furnaces, Warm Air

WASHERS, AIR

●Air & Refrigeration Corp., New York, N. Y.
Airwasher Corp., Lansing, Mich.
Alton Mfg. Co., Dallas, Tex.
●American Blower Corp., Detroit, Mich.
Bahnson Co., Winston-Salem, N. C.
Bayley Blower Co., Milwaukee, Wis.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Blower Application Co., Milwaukee, Wis.
Buensod-Stacey, Inc., New York, N. Y.
●Buffalo Forge Co., Buffalo, N. Y.
Carrier Corp., Syracuse, N. Y.
Centri-Spray Corp., Detroit, Mich. (Wet type)
●Clarage Fan Co., Kalamazoo, Mich.
Columbus Heating & Ventilating Co., Columbus, O.
Comfort Products Corp., Dallas, Tex.
●Continental Air Filters, Inc., Louisville, Ky.
Drying Systems, Inc., Chicago, Ill.
Economy Equipment Co., Chicago, Ill.
Kauffman Air Conditioning Corp., St. Louis, Mo.
Lehigh Fan & Blower Co., Allentown, Pa.
●Marlo Coil Co., St. Louis, Mo.
McQuay, Inc., Minneapolis, Minn.
Mellish & Murray Co., Chicago, Ill.
Mountain States Equipment Co., Denver, Colo.
Murray Mfg. Co., D. J., Wausau, Wis.
Parks-Cramer Co., Fitchburg, Mass.
Peters-Dalton, Inc., Detroit, Mich.
●Phillips Cooling Tower Co., Inc., Brooklyn, N. Y.
Schmieg Industries, Detroit, Mich.
Spray Engineering Co., Somerville, Mass.
Strandwitz & Co., Inc., W. J., Camden, N. J.
Tenney Engineering, Inc., Newark, N. J.
●Trane Co., The, LaCrosse, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.
Vilter Mfg. Co., Milwaukee, Wis.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
York Corp., York, Pa.

WATER CHILLERS

See Chillers, Water, for Air Conditioning and Refrigeration

WATER DISTRIBUTORS FOR CONDENSERS

See Distributors, Water, for Condensers

WATER FILTERS

See Filters, Water

WATER HEATERS

See Heaters, Indirect, Submerged; Heaters, Water

WATER METERS

See Meters, Water

WATER SOFTENERS

See Softeners, Water

WATER TREATMENT

See Treatment, Water, to Inhibit Corrosion; Devices, Electrolytic, for Preventing Corrosion

WATER VAPOR REFRIGERATION

See Compressors, Refrigerating, Centrifugal; and Compressors, Refrigerating, Steam Jet

WELD TESTING MACHINES

See Machines, Testing, Weld

WELDERS, ARC

Air Reduction Sales Co., New York, N. Y.
Allied Weld-Craft, Inc., Indianapolis, Ind.
Birdsell Mfg. Co., Inc., Mountain View, Calif.
Borm Mfg. Co., Elgin, Ill.
Eisler Engineering Co., Inc., Newark, N. J.
Electric Arc, Inc., Newark, N. J.
Ergolyte Mfg. Co., Philadelphia, Pa.
Eutectic Welding Alloys Corp., New York, N. Y.
Fern, Ralph, Scranton, Pa.
●General Electric Co., Apparatus Dept., Schenectady, N. Y.
Glenn-Roberts Co., Inc., Indianapolis, Ind.
Greyhound A. C. Arc Welder Corp., Brooklyn, N. Y.
Hammett Electric Mfg. Co., Kansas City, Mo.
Hampton Electric Mfg. Co., Pittsburgh, Pa.
Harnischfeger Corp., Milwaukee, Wis.
Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
Hobart Bros. Co., Troy, O.
Kern Co., John A., Chicago, Ill.
Lee Co., K. O., Aberdeen, S. D.
Lincoln Electric Co., Cleveland, O.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y. (Inert gas-shielded)
Marquette Mfg. Co., Minneapolis, Minn.
Metal & Thermit Corp., New York, N. Y.
Mid-States Equipment Co., Chicago, Ill.
Mid-States Welder Mfg. Co., Chicago, Ill.
Miller Electric Mfg. Co., Inc., Appleton, Wis.
National Cylinder Gas Co., Chicago, Ill.
Niagara Machine & Tool Wks., Buffalo, N. Y.
Smith Corp., A. O., Milwaukee, Wis.
Smith Welding Equipment Corp., Minneapolis, Minn.
Trindle Products, Ltd., Chicago, Ill.
Tweco Products Co., Wichita, Kan. (Cable connectors, electrode holders and accessories)
Welding Apparatus Co., Chicago, Ill.
Westinghouse Electric Corp., Pittsburgh, Pa.
Will-Weld Mfg. Co., Inc., Omaha, Neb.
Wilson Welder & Metals Co., Inc., New York, N. Y.

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WELDERS, SPOT

Acme Electric Welder Co., Los Angeles, Calif.
Acro Welder Mfg. Co., Milwaukee, Wis.
Agnew Electric Co., Milford, Mich.
Allied Weld-Craft, Inc., Indianapolis, Ind.
Alphil Spot Welding Co., Brooklyn, N. Y.
Birdsell Mfg. Co., Inc., Mountain View, Calif.
Doall Co., The, Des Plaines, Ill.
Eisler Engineering Co., Inc., Newark, N. J.
Electric Arc, Inc., Newark, N. J.
Federal Machine & Welder Co., The, Warren, O.
Fern, Ralph, Scranton, Pa.
Greyhound A. C. Arc Welder Corp., Brooklyn, N. Y.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y. (Inert gas-shielded arc)
Micro Products Co., Chicago, Ill.
Mid-States Welder Mfg. Co., Chicago, Ill.
Miller Electric Mfg. Co., Inc., Appleton, Wis.
Peer, Inc., Benton Harbor, Mich.
Precision Welder & Machine Co., Cincinnati, O.
Rex Welder & Engineering Co., Kansas City, Mo.
Sciaky Bros., Inc., Chicago, Ill.
Taylor-Winfield Corp., Warren, O.
Thomson Electric Welder Co., Lynn, Mass.
Universal Power Corp., Cleveland, O.
Weldex, Inc., Detroit, Mich.

WELDERS, STUD

Federal Machine & Welder Co., The, Warren, O.
Nelson Stud Welding, Div. of Morton Gregory Corp., Lorain, O.
Powder Power Tool Corp., Portland, Ore.

WELDING COMPOUNDS

See Compounds, Welding

WELDING AND CUTTING APPARATUS, OXY-ACETYLENE

Air Reduction Sales Co., New York, N. Y.
Allied Weld-Craft, Inc., Indianapolis, Ind.
Arcos Corp., Philadelphia, Pa. (arc-oxygen)
Atlas Welding Accessories Co., Ferndale, Mich. (Weld cleaning tools)
Black Mfg. Co., The, Baltimore, Md.
Dockson Corp., Detroit, Mich.
Eutectic Welding Alloys Corp., New York, N. Y.
Galv-Weld Products, Lima, O. (Regalvanizing process)
General Scientific Equipment Co., Philadelphia, Pa.
Goss Gas, Inc., Pittsburgh, Pa.
Harris Calorific Co., The, Cleveland, O.
Imperial Brass Mfg. Co., Chicago, Ill.
Johnson Machine Works, Eau Claire, Wis. (rotary work aligner)
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Liquid Carbonic Corp., The, Chicago, Ill.
Marquette Mfg. Co., Minneapolis, Minn.
Modern Engineering Co., St. Louis, Mo.
National Cylinder Gas Co., Chicago, Ill.
Powder Weld Process Co., The, Brooklyn, N. Y.
Sight Feed Generator Co., West Alexandria, O. (portable and stationary acetylene generators)
Smith Welding Equipment Corp., Minneapolis, Minn.
Tru-Line Corp., Santa Monica, Calif. (Protractor for marking pipe)
Wall Chemicals Div. of The Liquid Carbonic Corp., Chicago, Ill.
Worthington Pump & Machinery Corp., Dunellen, N. J. (Welding positioner)

WELDING FUME COLLECTORS

See Exhausters, Welding Fume

WELDING PIPE CLAMPS

See Clamps, Pipe, Welding

WELDING RINGS

See Rings, Welding

WELDING ROD

See Rod, Gas Welding

WHEELS, BLOWER

Advance Aluminum Castings Corp., Chicago, Ill.
Air Controls, Inc., Div. of Cleveland Heater Co., Cleveland, O.
Bayley Blower Co., Milwaukee, Wis.
●Bishop & Babcock Mfg. Co., Cleveland, O.
Bronson Fan Mfg. Co., Los Angeles, Calif.
●Brundage Co., The, Kalamazoo, Mich.
Burden Div., Torrington Mfg. Co., Los Angeles, Calif.
Carolina Blower Co., Inc., Greensboro, N. C.
Champion Blower & Forge Co., Lancaster Pa.
●Clarage Fan Co., Kalamazoo, Mich.
Goettl Bros. Metal Prod. Inc., Phoenix, Ariz.
Hastings Air Conditioning Co., Hastings, Neb.
Jaden Mfg. Co., Hastings, Neb.
●Jan Air, Inc., Richmond, Ill.
Lau Blower Co., Dayton, O.
Martin Fan & Blower Co., Chicago, Ill.
Mayne Products Co., Dayton, O.
Morrison Products, Inc., Cleveland, O.
●New York Blower Co., Chicago, Ill.
Palmer Mfg. Corp., Phoenix, Ariz.
Peerless Electric Co., Warren, O.
Revcor, Chicago, Ill.
Schwitzer-Cummins Co., Indianapolis, Ind.
Torrington Mfg. Co., Torrington, Conn.
Triangle Mfg. Co., Oshkosh, Wis.
●United States Air Conditioning Corp., Minneapolis, Minn.
Utility Appliance Corp., Los Angeles, Calif.
Viking Air Conditioning Corp., Cleveland, O.
Western Blower Co., Seattle, Wash.
●Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

WHITE PRINT MACHINES

See Machines, Blue Print and White Print

WINDOW VENTILATOR AND FILTER UNITS

See Units, Window Ventilator and Filter

WINDOWS, HEAT INSULATING

Anderson Corp., Bayport, Minn.
Chamberlin Co. of America, Detroit, Mich.
Ingersoll Products Div., Borg-Warner Corp., Chicago, Ill.
Kane Mfg. Corp., Kane, Pa.
Libbey-Owens-Ford Glass Co., Toledo, O.
Mississippi Glass Co., New York, N. Y.
Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Russell Co., F. C., The, Cleveland, O.

WIRE, ELECTRIC, NUMBERED, FOR CONTROL SYSTEMS

Electric Auto-Lite Co., Instrument & Gauge Div., Toledo, O.
Midwest Automatic Control Co., Des Moines, Ia.

WRENCHES, PIPE

American Machine Wks., Inc., Racine, Wis.
Armstrong Bros. Tool Co., Chicago, Ill.
Bernz Co., Otto, Rochester, N. Y.
Roddick Tool Co., Anaheim, Calif.
Billings & Spencer Co., Hartford, Conn.
Bonney Forge & Tool Works, Allentown, Pa.
Erie Tool Works, Erie, Pa.
E-Zee Tool Mfg. Corp., New York, N. Y.
Lowell Wrench Co., Worcester, Mass.
Nye Tool Co., Chicago, Ill.
Peck, Stow & Wilcox Co., Southington, Conn.
●Ridge Tool Co., Elyria, O.
Sac Tool Mfg Co., St. Louis, Mo.
Snap-on Tools Corp., Kenosha, Wis.
Trimont Mfg. Co., Div. of Aetna Industrial Corp., Boston, Mass.
USHCO Mfg. Co., Inc., Buffalo, N. Y.
●Walworth Co., New York, N. Y.

WRENCHES, RATCHET

Armstrong Bros. Tool Co., Chicago, Ill.
Billings & Spencer Co., Hartford, Conn.
Blackhawk Mfg. Co., Milwaukee, Wis.
Bonney Forge & Tool Works, Allentown, Pa.
Duro Metal Products Co., Chicago, Ill.
Greene, Tweed & Co., North Wales, Pa.
J O Mfg. Co., South Gate, Calif.
Lowell Wrench Co., Worcester, Mass.
Sac Tool Mfg. Co., St. Louis, Mo.
Snap-on Tools Corp., Kenosha, Wis.
William & Co., J. H., Buffalo, N. Y.

WRENCHES, TORQUE INDICATING

Ammco Tools, Inc., North Chicago, Ill.
Armstrong Bros. Tool Co., Chicago, Ill.
Blackhawk Mfg. Co., Milwaukee, Wis.
Bonney Forge & Tool Works, Allentown, Pa.
Duro Metal Products Co., Chicago, Ill.
J O Mfg. Co., South Gate, Calif.
Richmont, Inc., Los Angeles, Calif.
Sac Tool Mfg. Co., St. Louis, Mo.
Snap-on Tools Corp., Kenosha, Wis.
Sturtevant Co., P. A., Addison, Ill.
Williams & Co., J. H., Buffalo, N. Y.

X-RAY MACHINES AND FILM

See Machines and Film, X-Ray

ZONE CONTROLS

See Systems, Heating, Zone Control

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DIRECTORY SECTION

HEATING, PIPING, AND AIR CONDITIONING EQUIPMENT FOR INDUSTRY AND LARGE BUILDINGS

PART 2

TRADE NAMES

If you have the trade name of a product and want to know who manufactures it, look here in Part 2, where trade names are alphabetically listed. Trade names the same as or identifiable from the company name are not listed. Manufacturers with such trade names can be easily identified under their product classification in Part 1.

Heating, Piping & Air Conditioning
6 N. Michigan Ave.
Chicago 2, Illinois

A-B—Motor controllers. Allen-Bradley Co., Milwaukee, Wis.

ABC—Humidifiers, dust collectors, unit coolers. American Blower Corp., Detroit, Mich.

A-C—Water treatment. Elgin Softener Corp., Elgin, Ill.

ACB—Coatings. Tropical Paint & Oil Co., Cleveland, O.

A/C Range—Filters. American Air Filter Co., Inc., Louisville, Ky.

A.P.S. Plasteel—Metal sheets. Plasteel Products Co., Washington, Pa.

A.R.A.—Non-metallic sheets and board. Grant Wilson, Inc., Chicago, Ill.

ARRC—Couplings, fittings, flanges, unions. Union Metal Wks., Chelsea, Mass.

ASBO—Ventilators, louvers and shutters. American Steel Band Co., Pittsburgh, Pa.

Abrasoweld—Electrodes. Lincoln Electric Co., Cleveland, O.

Abso-Lute—Cement and compounds. Key Co., East St. Louis, Ill.

Accordion—Insulation. Infra Insulation, Inc., New York, N. Y.

Ace—Dampers. Martens & Stormoen, Boston, Mass.

Ace—Fittings, pipe, protective coatings, pumps, tanks, valves. American Hard Rubber Co., New York, N. Y.

Ace—Welders. Peer, Inc., Benton Harbor, Mich.

Ace-Parian—Fittings, pipe. American Hard Rubber Co., New York, N. Y.

Ace-Saran—Pipe, tubing. American Hard Rubber Co., New York, N. Y.

Aco-Fin—Radiation. Airecon Industries, Detroit, Mich.

Acolite—Enamels and lacquers. Acorn Refining Co., Cleveland, O.

Acousteel—Insulation. Celotex Corp., The, Chicago, Ill.

Acousti-Celotex—Insulation. Celotex Corp., The, Chicago, Ill.

Acoustilite—Insulation. Insulite Co., Minneapolis, Minn.

Acratherm—Thermostats. Minneapolis-Honey-Well Regulator Co., Minneapolis, Minn.

Actex—Heat exchangers. Wabash Mfg. Co., Chicago, Ill.

Adamant—Furnace cement. Botfield Refractories Co., Philadelphia, Pa.

Adastic—Insulating cement. Botfield Refractories Co., Philadelphia, Pa.

Adjust-O-Feeder—Feeders, pumps, water treatment. % Proportioneers, Inc. %, Providence, R. I.

Adjustor—Heating systems. The Kehm Corp., Chicago, Ill.

Adsco—Coils, conduit, regulators, coolers, exchangers, heaters, joints, meters, pipe, pipe hangers and supports, pipe protectors, separators, sight glasses, strainers, regulators, valves. American District Steam Co., North Tonawanda, N. Y.

Adsco Dual—Traps. American District Steam Co., North Tonawanda, N. Y.

Adsco Rotary—Condensation meters. American District Steam Co., North Tonawanda, N. Y.

Aemco—Relays, switches. Automatic Electric Mfg. Co., Mankato, Minn.

Aeracool—Blades, fans, louvers and shutters, ventilators. Myers Electric Co., Inc., Pittsburgh, Pa.

Aerisweld—Electrodes. Lincoln Electric Co., Cleveland, O.

Aero—Roof ventilators. Jordan & Co., Paul R., Indianapolis, Ind.

Aero—Aftercoolers, heat exchangers. Niagara Blower Co., New York, N. Y.

Aero—Radiation. National Radiator Co., The, Johnstown, Pa.

Aerodyne—Fans. Jeffrey Mfg. Co., Columbus, O.

Aero-Flex—Registers. Auer Register Co., Cleveland, O.

Aerofuse—Air diffusers. Tuttle & Bailey, Inc., New Britain, Conn.

Aerolux—Air conditioning units. Johnson Co., S. T., Philadelphia, Pa.

Aeromaster—Propeller fans. Aeromatic Propeller Dept., Koppers Co., Inc., Baltimore, Md.

Aeropass—Condensers. Niagara Blower Co., New York, N. Y.

Aeropel—Ventilators. American Blower Corp., Detroit, Mich.

Aeroplane—Roof ventilators. Jordan & Co., Paul R., Indianapolis, Ind.

Aeroplex—Fans. Bayley Blower Co., Milwaukee, Wis.

Aeropull—Roof ventilators. Jordan & Co., Paul R., Indianapolis, Ind.

Aero Seal—Packing. Chicago Belting Co., Chicago, Ill.

Aerospot—Fans. South Bend Air Products, Inc., South Bend, Ind.

Aerotec—Cleaners, collectors, separators, switches, valves. Thermix Corp., The, Greenwich, Conn.

Aerovane—Anemometers. Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.

Aerovane—Grilles, registers. Tuttle & Bailey, Inc., New Britain, Conn.

Afco—Heaters. American Furnace Co., St. Louis, Mo.

Affco—Louvers and shutters. American Foundry & Furnace Co., Bloomington, Ill.

Agastat—Time switches, electrical relays. American Gas Accumulator Co., Elizabeth, N. J.

Agile—Welding electrodes. American Agile Corp., Cleveland, O.

Agitair—Air diffusers, filters, heaters, ventilators. Air Devices, Inc., New York, N. Y.

Airacoustic—Insulation. Johns-Manville, New York, N. Y.

Airate—Ventilators. Dickinson, Aeolus, Chicago, Ill.

Air Cell—Asbestos insulation. Keasbey & Mattison Co., Ambler, Pa.

Airco—Arc welders, welding rod, solder, pipe cutting machines, torches. Air Reduction Sales Co., New York, N. Y.

Air Control—Fans, heaters, unit air conditioners. Hastings Air Conditioning Co., Hastings, Neb.

Air-Con—Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.

Airefiner—Water treatment. Oakite Products, Inc., New York, N. Y.

Airex—Air washers, fans, unit air conditioners, ventilators. Mountain States Equipment Co., Denver, Colo.

Air-flo—Louvers and shutters. Air Conditioning Products Co., Detroit, Mich.

Air Flow—Fans. Goettl Bros. Metal Prod. Inc., Phoenix, Ariz.

Airfoil—Fans, fan blades, ventilators. Aerovent Fan Co., Inc., Piqua, O.

Airfoil—Dampers, diffusers, grilles, registers. Titus Mfg. Corp., Waterloo, Ia.

Airgraph—Thermometers. Hausman Mfg. & Sales Co., Chicago, Ill.

Airguide—Hygrometers, thermometers. Fee and Stemwedel, Inc., Chicago, Ill.

Air Guide—Vanes. Titus Mfg. Corp., Waterloo, Ia.

Air Guide—Radiation. Rempe Co., Chicago, Ill.

Airidge—Ventilators. Dickinson, Aeolus, Chicago, Ill.

Airistocrat—Fan blades. Torrington Mfg. Co., Torrington, Conn.

Airjector—Ventilators. Swartwout Co., Cleveland, O.

Airlouver—Louvers and shutters. Swartwout Co., Cleveland, O.

Airlift—Ventilators. Swartwout Co., Cleveland, O.

Airliner—Fan blades. Burden Co., Alan E., Hollywood, Calif.

Airmat Arrester—Dust collectors. American Air Filter Co., Inc., Louisville, Ky.

Air-Max—Ventilators. Gallaher Co., The, Omaha, Neb. & Owatonna, Minn.

Air Meter—Air velocity meters. Hastings Instrument Co., Hampton, Va.

Airmover—Ventilators. Swartwout Co., Cleveland, O.

Airpak—Filters. Conoflow Corp., Philadelphia, Pa.

Airocool—Burners. National Airoil Burner Co., Inc., Philadelphia, Pa.

Airoil—Oil burners. National Airoil Burner Co., Inc., Philadelphia, Pa.

Air-O-Line—Indicator-controllers, recorder-controllers. Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.

Air-O-Line—Pumps, valves. Beckett & Co., Inc., Thomas, Dallas, Tex.

Air-O-Matic—Air conditioning units. Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.

Airotor—Blower wheels. Torrington Mfg. Co., Torrington, Conn.

Airout—Ventilators. Western Engineering & Mfg. Co., Los Angeles, Calif.

Airovent—Gas Burners. National Airoil Burner Co., Inc., Philadelphia, Pa.

Air Pilot—Window ventilator and filter units. Remington Air Conditioning Corp., Cortland, N. Y.

Airsan—Filters. Air Filter Corp., Milwaukee, Wis.

Airstat — Regulators. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Airstream—Blower wheels, fans. Morrison Products, Inc., Cleveland, O.

Airswitch—Thermostats, regulators. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Airtopia—Air conditioning units. Drayer & Hanson, Inc., Los Angeles, Calif.

Airtrol—Air eliminators. Bell & Gossett Co., Morton Grove, Ill.

Airtron—Ducts and duct fittings, hose, insulation. Arrowhead Rubber Co., Downey, Calif.

Air-Tumbler—Dust collectors. Dust Suppression & Engineering Co., Lake Orion, Mich.

Airturn—Duct turning vanes. Barber-Colman Co., Rockford, Ill.

Airvalve—Ventilators. Swartwout Co., Cleveland, O.

Air-Van—Ventilators, exhausters. The Gallaher Co., Owatonna, Minn., Omaha, Neb.

Air-Wave—Fans. Trade-Wind Motorfans, Inc., Los Angeles, Calif.

Airxpel—Traps. Wright-Austin Co., Detroit, Mich.

Airxpeler—Roof ventilators. Ammerman Co., G. L., Minneapolis, Minn.

Ajax—Gaskets, United States Gasket Co., Camden, N. J.

Akon—Water treatment. Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Aktiv—Cleaning compounds. Turco Products, Inc., Los Angeles, Calif.

Alcalex—Water softeners. Research Products Corp., Madison, Wis.

Alco—Ventilators. Lumm Co., A. H., Toledo, O.

Alcoa—Angles, compounds, rods, dehydrators, electrodes, exchangers, pipe, sheets, tanks, tubing. Aluminum Co. of America, Pittsburgh, Pa.

Alcuplate—Clad sheets. General Plate Div., Metals & Controls Corp., Attleboro, Mass.

Alfol—Insulation. Reflectal Corp., New York, N. Y.

Algaecide—Water treatment. Western Chemical Co., Kansas City, Mo.

Allencote—Refractories and refractory cement. Allen Co., Robert G., Mechanicsville, N. Y.

Allenite—Soot destroyers. Allen Co., Robert G., Mechanicsville, N. Y.

All-Flex—Pipe joints, hose, packing. Gil-Lair Products, Inc., Pasadena, Calif.

All-In-One—Regulators. Bell & Gossett Co., Morton Grove, Ill.

Allspeed Selector—Mechanical changers. Worthington Pump & Machinery Corp., Harrison, N. J.

Alnor—Anemometers, indicator controllers, thermometers. Illinois Testing Laboratories, Inc., Chicago, Ill.

Alodine—Protective coatings. American Chemical Paint Co., Ambler, Pa.

Aloyco—Stainless steel fittings, nipples, pipe, tubing, unions, valves. Alloy Steel Products Co., Linden, N. J.

Alpine—Air conditioning units. International Metal Products Co., Phoenix, Ariz.

Alrosept—Slime and algae control treatment. Alrose Chemical Co., Providence, R. I.

Alternarc—Arc welders. Electric Arc, Inc., Newark, N. J.

Alumaweld—Solder and fluxes. Johnson Mfg. Co., Inc., Mt. Vernon, Ia.

Aluminweld—Electrodes. Lincoln Electric Co., Cleveland, O.

Alumiseal—Insulation. Hogan & Co., Inc., C. T., New York, N. Y.

A-Lum-O—Filters. Bard Mfg. Co., Bryan, O.

A-Lum-O—Filters. Carey Electronic Engineering Co., Metal Wool Div., Springfield, O.

Always Reliable—Benders, cutters, torches, wrenches. Bernz Co., Otto, Rochester, N. Y.

Amblerex—Insulating cement. Keasbey & Mattison Co., Ambler, Pa.

Amco—Protective coatings. American Solder & Flux Co., Philadelphia, Pa.

Amco—Humidifiers. Grinnell Co., Inc., Providence, R. I.

Amco—Humidifiers, humidistats, hygrometers. American Moistening Co., Providence, R. I.

Amco—Gaskets, packing. Austin-Mason Co., Everett, Mass.

Amcoil—Condensers, radiation, cooling and heating surfaces. American Coils Co., Newark, N. J.

Amer-glas—Unit filters. American Air Filter Co., Inc., Louisville, Ky.

American—Absorbers, metal hose. American Metal Hose Branch, American Brass Co., The, Waterbury, Conn.

American—Couplings. American Flexible Coupling Co., Erie, Pa.

American—Furnaces, heaters. American Foundry & Furnace Co., Bloomington, Ill.

American—Recorders, indicator-controllers, manometers, regulators, valves, thermometers. Manning, Maxwell & Moore, Inc., Bridgeport, Conn.

American—Meters. American Meter Co., Inc., New York, N. Y.

American—Speed reducers. American Pulley Co., Philadelphia, Pa.

American—Pumps, softeners, water filters, water treatment. American Well Works, Aurora, Ill.

American—Pipe benders. American Pipe Bending Machine Co., Inc., Poultney, Vt.

American—Radiation. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Empire—Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Exbrook—Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Hy—Unit Filters. American Air Filter Co., Inc., Louisville, Ky.

American Redflash-Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Standard—Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

American Water Tube—Boilers. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

Amerigear—Couplings. American Flexible Coupling Co., Erie, Pa.

Ameritherm—Heaters, air conditioning units. American Thermal Industries, Inc., Detroit, Mich.

Amesteam—Boilers. Ames Iron Works, Div. of Pierce Butler Radiator Corp., Oswego, N. Y.

Aminco—Indicator-controllers, indicators, American Instrument Co., Silver Spring, Md.

Ammonoduct—Pipe. Bethlehem Steel Co., Bethlehem, Pa.

Am-Pe-Co—Centrifugal fans. American Machine Products Co., Marshalltown, Ia.

Amtico—Heaters, air conditioning units. American Thermal Industries, Inc., Detroit, Mich.

Anaconda—Fittings, pipe, welding rod, sheets, solder, tubing, valves. American Brass Co., Waterbury, Conn.

Anemotherm—Direct reading meters, Anemostat Corp. of America, New York, N. Y.

Ankorite—Packing. Anchor Packing Co., Philadelphia, Pa.

Anthracite 1600—Water heaters. Catskill Metal Works, Inc., Catskill, N. Y.

Anti-Sweat—Insulation. Johns-Manville, New York, N. Y.

Apeco—Blueprint machines. American Photocopy Equipment Co., Chicago, Ill.

Apex—Analyzers, recorders, indicators. Uehling Instrument Co., Paterson, N. J.

Apex—Regulators, dampers. Ohio Products Co., Cleveland, O.

Apexior—Coatings. Dampney Co. of America, Boston, Mass.

Aqua-Clear—Water treatment. Sudbury Laboratory, South Sudbury, Mass.

AquaHeater—Heaters. Lewis & Co., Joseph E., Baltimore, Md.

Aqualator—Circulators. Triplex Heating Specialty Co., Inc., Peru, Ind.

Aquamizer—Condensers. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.

Aquastat—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Aqua-Tite—Seals. Schwitzer-Cummins Co., Indianapolis, Ind.

Aquatone—Treatment, steam and water. Ampion Corp., Long Island City, N. Y.

Aquatower—Cooling towers. Marley Co., Inc., The, Kansas City, Kan.

Aqulux—Heaters. Johnson Co., S. T., Philadelphia, Pa.

Arbest—Flanges, hangers, humidifiers, nipples, plates, valves. G & H Mfg. Co., Philadelphia, Pa.

Arc-Eng—Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.

Arc-Heat—Burners. American Heat Corp., Lowell, Mass.

Arco—Packing. Chicago Belting Co., Chicago, Ill.

Arco—Hangers, radiation. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

Arctic Circle—Air conditioning units. Goettl Bros. Metal Prod., Inc., Phoenix, Ariz.

Arctic Circle—Air conditioning units. International Metal Products Co., Phoenix, Ariz.

Arex-Austor—Roof ventilators. Arex Co., Chicago, Ill.

Arid Air—Dehumidifiers. Tamms Industries, Inc., Chicago, Ill.

Arin—Louvers and shutters. Arex Co., Chicago, Ill.

Armaloy—Wrenches. Armstrong Bros. Tool Co., Chicago, Ill.

Armorak—Insulation. Keasbey Co., Robert A., New York, N. Y.

Arrowtrol—Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.

Art—Direct radiation. The National Radiator Co., Johnstown, Pa.

Artcraft—Air heaters. Chicago Steel Furnace Co., Chicago, Ill.

Asbestocel—Insulation. Johns-Manville, New York, N. Y.

Asco—Valves, relays, switches. Automatic Switch Co., Orange, N. J.

Ashcroft—Gages, cocks, recorders, testers. Manning, Maxwell & Moore, Inc., Bridgeport, Conn.

At-a-Glance—Gages. Krueger Sentry Gauge Co., Green Bay, Wis.

Atlas—Fans, furnaces, heaters. International Sales Co., San Francisco, Calif.

Atmoset—Cement. Green Fire Brick Co., Mexico, Mo.

Atomick—Humidifiers, nozzles. Maid-O'-Mist, Inc., Chicago, Ill.

Atomist—Humidifiers. American Foundry & Furnace Co., Bloomington, Ill.

Autocrat—Oil burners. Chandler Co., Cedar Rapids, Ia.

Auto-Klean—Filters, strainers. Cuno Engineering Corp., Meriden, Conn.

Autolite—Motors, wire, recorders, thermometers. Electric Autolite Co., Instrument & Gauge Div., Toledo, O.

Autolube—Bearings. International Powder Metallurgy, Inc., Ridgway, Pa.

Automatic Heat—Heaters. Heat Equipment not Inc., Chicago, Ill.

Autovent—Eliminators, humidifiers, valves. Maid-O'-Mist, Inc., Chicago, Ill.

Axivane—Fans. Joy Mfg. Co., Pittsburgh, Pa.

B.A.C.—Condensers. Baltimore Aircoil Co., Inc., Baltimore, Md.

B. B.—Blast gates. Berger Bros. Co., Philadelphia, Pa.

B & B—Heating and air conditioning equipment. Bishop & Babcock Mfg. Co., Cleveland, O.

B & C—Plates, malleable unions. Beaton & Corbin Mfg. Co., Southington, Conn.

BCA—Bearings. Bearings Co. of America, Lancaster, Pa.

B. & G.—Air eliminators, circulators, coolers, condensers, fittings, hangers, heat exchangers, heaters, heating systems, temperature regulators, tanks, valves. Bell & Gossett Co., Morton Grove, Ill.

B-H—Insulation. Baldwin-Hill Co., Trenton, N. J.

B-H—Insulating cement, pipe insulation. Baldwin-Hill Co., Trenton, N. J.

B & J—Orifices, strainers, systems, traps, valves. Barnes & Jones, Inc., Boston, Mass.

B & K—Pipe cutting and threading machines. Bignall & Keeler, Div., John Ramming Machine Co., St. Louis, Mo.

B-Line—Electric motors. Brown-Brockmeyer Co., Inc., Dayton, O.

BRI Gun—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.

B & W—Boilers, burners, desuperheaters, fuel economizers, refractories, stokers, superheaters. Babcock & Wilcox Co., New York, N. Y.

B & W—Pipes, tubes, and tubing. Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.

B & W—Tubing. Babcock & Wilcox Tube Co., The, Welded Tube Div., Alliance, O.

Bacite—Insulation. Bird-Archer Co., Philadelphia, Pa.

Baco—Refractories. Bird-Archer Co., Philadelphia, Pa.

Badger—Time switches. Reliance Automatic Lighting Co., Racine, Wis.

Baflex—Enamels and lacquers, protective coatings. Interchemical Corp., Finishes Div., Newark, N. J.

Bakeraire—Unit air conditioners. Baker Refrigeration Corp., South Windham, Me.

Balancer—Heating systems. Automatic Temperature Control Co., Inc., Philadelphia, Pa.

Baldwin-Rex—Couplings, chain drives. Chain Belt Co., Milwaukee, Wis.

Ball Bushings—Ball bearings. Thomson Industries, Inc., Manhasset, N. Y.

Balsam-Wool—Insulation. Wood Conversion Co., St. Paul, Minn.

Bankheat—Oil burners. Johnson Co., S. T., Philadelphia, Pa.

Barcol—Humidistats, motors, operators, regulators, thermostats, valves. Barber-Colman Co., Rockford, Ill.

Barnes—Cutters. Erie Tool Works, Erie, Pa.

Barreled Sunlight—Enamels. U.S. Gutta Percha Paint Co., Providence, R. I.

Barry—Bearings, pulleys and sheaves. Dick Co., Inc., R. & J., Passaic, N. J.

Barton-American—Pumps. American-Marsh Pumps, Inc., Battle Creek, Mich.

Base Ray—Baseboard radiation. Burnham Corp., Boiler Div., Irvington, N. Y.

Basifrit—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.

Beacor—Valves. Beaton & Corbin Mfg. Co., Southington, Conn.

Beauticast—Radiation. Columbia Radiator Co., McKeesport, Pa.

Beaverkill—Leather belting and v-belts. Baldwin Belting, Inc., New York, N. Y.

Beco-Cell—Corrosion treatment, scale removal. Brown Electro Co., Oklahoma City, Okla.

Belco—Fans, louvers and shutters. Belter Electric Mfg. Co., G. J., The, St. Louis, Mo.

Bell-Pack—Clamps. Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.

Beloit—Machines, punches, power shears. Hendley & Whittemore Co., Beloit, Wis.

Bend-Ezy—Grilles, registers. Standard Stamping & Perforating Co., Chicago, Ill.

Bermico—Fiber glass. Brown Co., New York, N. Y.

Bestfelt—Insulation. Keasbey & Mattison Co., Ambler, Pa.

Beth-Co-Weld—Pipe. Bethlehem Steel Co., Bethlehem, Pa.

Beth-Cu-Loy—Sheets. Bethlehem Steel Co., Bethlehem, Pa.

Bi-Air—Burners. John Zink Co., Tulsa, Okla.

Bifurcator—Fans. DeBothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.

Bildrite—Insulation. Insulite Co., Minneapolis, Minn.

Bilt-Rite—Doors and panels. Canton Stoker Corp., Canton, O.

Bi-Mix—Burners. John Zink Co., Tulsa, Okla.

Binoc—Thermometers. Taylor Instrument Companies, Rochester, N. Y.

Bison—Boilers. Farrar & Trefts, Buffalo, N. Y.

Bitumastic—Protective coatings. Koppers Co., Inc., Pittsburgh, Pa.

Bituminous—Coatings. Robertson Co., H. H., Pittsburgh, Pa.

Bituplastic—Coatings. Koppers Co., Inc., Pittsburgh, Pa.

Black Baking Japans—Enamels and lacquers. Hilo Varnish Co., Brooklyn, N. Y.

Black Magic—Pipe covering adhesives, protective coatings. Miracle Adhesives Corp., New York, N. Y.

Black Magic—Cement and compounds. Bowser, Inc., Fort Wayne, Ind.

Blazecrete—Refractories. Johns-Manville, New York, N. Y.

Bloapco—Dust collectors. Blower Application Co., Milwaukee, Wis.

Blo-Cold—Unit coolers. Acme Industries, Inc., Jackson, Mich.

Bloflex—Hose. American Ventilating Hose Co., New York, N. Y.

Blowertrol—Speed changers. White Mfg. Co., St. Paul, Minn.

Blu-Cold—Compressors. Lehigh Mfg. Co., Div. of Lehigh Foundries, Inc., Lancaster, Pa.

Blueknight—Enamels and lacquers. Interchemical Corp., Finishes Div., Newark, N. J.

Blue-Point—Tools, wrenches. Snap-on Tools Corp., Kenosha, Wis.

Blue Ribbon—Headers and nipples. Chicago Nipple Mfg. Co., Cicero, Ill.

Blue Streak—Blueprint machines. Paragon-Revolute Corp., Rochester, N. Y.

Boardman—Pump governors. Locke Regulator Co., Salem, Mass.

Bob—Float valves. Robert Mfg. Co., Los Angeles, Calif.

Boilergard—Low water cut-offs. Maid-O'-Mist, Inc., Chicago, Ill.

Boiler Solder Seal—Compounds. Radiator Specialty Co., Charlotte, N. Carolina.

Bosco—Clay pipe. Bowerston Shale Co., Bowerston, O.

Brad-Ray—Radiant heating coils and panels. Jos. L. Bradfield, Indianapolis, Ind.

Branford—Oil burners, unions. Malleable Iron Fittings Co., Branford, Conn.

Brassweld—Compounds. Sight Feed Generator Co., West Alexandria, O.

Brazo—Solder. Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.

Breathe-O-Stat—Thermostats. McLarty Systems, Battle Creek, Mich.

Breezo—Fans. Buffalo Forge Co., Buffalo, N. Y.

Breezy-Air—Air conditioning units. Barwick Mfg. Corp., Wichita, Kan.

Brommell—Eliminators, floats, heating systems, traps, valves. Vapor Specialty Co., New York, N. Y.

Bronzende—Electrodes. Arcos Corp., Philadelphia, Pa.

Bronzeweld—Compounds. Sight Feed Generator Co., West Alexandria, O.

Brooklyn—Adhesive tape. Johns-Manville, New York, N. Y.

BTUnit—Unit heaters. Industrial Mfg. & Engineering Co., Chicago, Ill.

Budget—Water heaters. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

Bulator—Grilles. Hendrick Mfg. Co., Carbondale, Pa.

Bulldog—Shears and snips. Wiss & Sons Co., J., Newark, N. J.

Bull Dog—Stocks and dies. Oster Mfg. Co., Cleveland, O.

Bull Dog—Pipe and tubing. Phelps Dodge Copper Products, British American Tube Div., New York, N. Y.

Bull Dog—Valves. The Carpenter Mfg. Corp., Cleveland, O.

Bundyflex—Steel tubing. Everhot Products Co., Chicago, Ill.

Bundyweld—Tubes and tubing. Bundy Tubing Co., Detroit, Mich.

Bunker Hill—Fittings, pipe, sheets, solder. Northwest Lead Co., Seattle, Wash.

Burks—Pumps. Decatur Pump Co., Decatur, Ill.

Burnham—Compressors, condensers, pumps. Union Steam Pump Co., Battle Creek, Mich.

C-E—Boilers, burners, stokers, fuel economizers. Combustion Engineering - Superheater, Inc., New York, N. Y.

C F B Super—Cement. Chicago Fire Brick Co., Chicago, Ill.

C-H—Alarms, controllers and starters, heaters, relays, regulators, switches, valves. Cutler-Hammer, Inc., Milwaukee, Wis.

C & M—Hangers or brackets. Carty & Moore Engineering Co., Detroit, Mich.

CMH—Pipe joints. Chicago Metal Hose Corp., Maywood, Ill.

COM—Blowers. Wing Mfg. Co., L. J., New York, N. Y.

C & R—Regulators. Automatic Control Co., St. Paul, Minn.

CSP—Transformers. Westinghouse Electric Corp., Pittsburgh, Pa.

CW—Pipe. Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.

Cadillac-Meters. Central Station Steam Co., Detroit, Mich.

Cadman—Valves. Barrett Machine Co., Pittsburgh, Pa.

Cadwell—Pressure regulators, valves. Beaton & Cadwell Mfg. Co., New Britain, Conn.

Calco—Valves. California Brass Mfg. Co., Los Angeles, Calif.
Calktite—Cement and compounds. U. S. Stoneware Co., New York, N. Y.
Calorex—Oil burners. W. N. Best Combustion Equipment Co., Inc., Carlstadt, N. J.
Cantilever—Hygrometers. Standard Thermometers, Inc., Boston, Mass.
Capacilogs—Temperature recorders. Wheelco Instruments Co., Chicago, Ill.
Capacitrols—Indicator - controllers. Wheelco Instruments Co., Chicago, Ill.
Capillary—Air washers. Clarage Fan Co., Kalamazoo, Mich.
Capillary—Air washers, humidifiers, cooling towers, unit air conditioners. Air & Refrigeration Corp., New York, N. Y.
Capitol—Boilers, hanger or brackets, heaters, radiation. United States Radiator Corp., Detroit, Mich.
Carbolite—Soot destroyers. Ampion Corp., Long Island City, N. Y.
Careyduct—Ducts and duct fittings, insulation, non-metallic sheets, duct turning vanes. Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Cash-Acme—Heating systems, pipe strainers, regulators, valves. Cash Valve Mfg. Co., A. W., Decatur, Ill.
Castalu—Fans, wheels. Advance Aluminum Castings Corp., Chicago, Ill.
Cast-Refract—Refractories. Quigley Co., Inc., New York, N. Y.
Catch-All—Dehydrators. Sporlan Valve Co., St. Louis, Mo.
Causul—Valves. Lunkenheimer Co., Cincinnati, O.
Celeritas—Colorimeters. Daigger & Co., A., Chicago, Ill.
Celeron—Couplings, fittings. Continental Diamond Fibre Co., Newark, Del.
Cell-U-Blanket—Insulation. Masonite Corp., Chicago, Ill.
Cellufoam—Insulation. Masonite Corp., Chicago, Ill.
Celo-Siding—Insulation. Celotex Corp., The, Chicago, Ill.
Cemcoat—Enamels and lacquers. Sonneborn Sons, Inc., New York, N. Y.
Cementseal—Enamels and lacquers. Acorn Refining Co., Cleveland, O.
Cemesto—Insulation. Celotex Corp., The, Chicago, Ill.
Central Aire—Unit air conditioners. Baker Refrigeration Corp., South Windham, Me.
Central—Conduit. Spang-Chalfant, Div. of National Supply Co., Pittsburgh, Pa.
Centrimax—Meters. Leeds & Northrup Co., Philadelphia, Pa.
Centripac—Packing. Johns-Manville, New York, N. Y.
Centripeller—Roof ventilators. Jordan & Co., Paul R., Indianapolis, Ind.
Certified Climate—Air conditioning units. Parks-Cramer Co., Fitchburg, Mass.
Cesco—Fittings. Columbia Engineering Service Co., San Francisco, Calif.
Chaco—Boiler and radiator sealing compounds. Desolvo Co., The, Pittsburgh, Pa.
Challenger—Propeller fans. Signal Electric Mfg. Co., Menominee, Mich.
Champion—Furnaces, heaters. National Heater Co., St. Paul, Minn.
Champion—Gas fired heaters. Bastian-Morley Co., Inc., LaPorte, Ind.
Champion—Pumps. Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Chan-L-Mounts—Bases and pads. Lord Mfg. Co., Erie, Pa.
Chemiseal—Gaskets, joints, packing. United States Gasket Co., Camden, N. J.
Chem-o-Feeder—Feeders, pumps, water treatment. % Proportioneers, Inc., % Providence, R. I.
Chenco—Compounds, water treatment. Chemical Engineering Co., Dallas, Tex.
Chevron—Packing. Garlock Packing Co., Palmyra, N. Y.
Chicago—Brakes. Dreis & Krump Mfg. Co., Chicago, Ill.
Chicago—Stokers. Eddy Stoker Corp., Chicago, Ill.
Chicago—Stokers. Standard Stoker Co., Inc., Erie, Pa.
Chicago-Wrigley—Bolts. Chicago Expansion Bolt Co., Chicago, Ill.
Chico Brikset—Cement. Chicago Fire Brick Co., Chicago, Ill.
Chieftain—Compressors. Tecumseh Products Co., Tecumseh, Mich.
Chief Thred-O-Matic—Pipe cutting machines. Quijada Tool Co., Inc., Los Angeles, Calif.
Chill Air—Air conditioning units. National Engineering & Mfg. Co., Kansas City, Mo.
Chill-Vactor—Chillers and steam jet compressors. Croll-Reynolds Engineering Co., Inc., New York, N. Y.
Chimney Sweep—Chemical destroyers. Coughlan Co., G. N., West Orange, N. J.
Chinook—Ferrous heating surface. Bayley Blower Co., Milwaukee, Wis.
Chinookfin—Ferrous heating surface. Bayley Blower Co., Milwaukee, Wis.
Chlorimet—Heat exchangers, fans, fittings, heaters, pipe, pumps, sheets, valves. Duriron Co., Inc., The, Dayton, O.
Chore Boy—Burners. Standard Fuel Engineering Co., Detroit, Mich.
Chromalox—Preheaters, indicators-controllers, heating systems, thermostats, unit heaters. Wiegand Co., Edwin L., Pittsburgh, Pa.
Chrome Lock—Gaskets. Products Research Co., Los Angeles, Calif.
Chromend—Electrodes. Arcos Corp., Philadelphia, Pa.
Chromeweld—Electrodes. Lincoln Electric Co., The, Cleveland, O.
Chromix—Refractories. Quigley Co., Inc., New York, N. Y.
Chronoflo—Flow meters, recorders. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Chronometer—Valves. Defender Instrument & Regulator Co., St. Louis, Mo.
Chronotherm—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Cinch—Expansion bolts. National Lead Co., New York, N. Y.
Circle Seal—Check valves. James-Pond-Clark, Pasadena, Calif.
Circle T—Switches. Trumbull Electric Co., The, Plainville, Conn.
Circo—Louvers and shutters, fan housings. Circulators & Devices Mfg. Co., Brooklyn, N. Y.
Clair-Bond—Adhesives. St. Clair Rubber Co., Detroit, Mich.
Clamp-A-Leak—Pipe repair clamps. Chelsea Metal Stamping Co., New York, N. Y.
Clarco—Unit heaters. Clarage Fan Co., Kalamazoo, Mich.
Classic—Registers. Auer Register Co., Cleveland, O.
Clevite—Bearings. Cleveland Graphite Bronze Co., Cleveland, O.
Cliff—Boilers, water heaters. Terre Haute Boiler Works Co., Terre Haute, Ind.
Climate Changer—Unit air conditioners, unit air coolers. Trane Co., The, LaCrosse, Wis.
Climatrol—Boilers, furnaces, heaters, fans, metallic ducts. Mueller Furnace Co., L. J., Milwaukee, Wis.
Clime-Matic—Unit air conditioner. United Conditioning Corp., New York, N. Y.
Clime-matic Coey—Cooling towers. United Conditioning Corp., New York, N. Y.
Clipper—Fans. Trade-Wind Motorfans, Inc., Los Angeles, Calif.
Clipper—Seals. Johns-Manville, New York, N. Y.
Clorodine—Boiler cleaning compounds. American Chemical Paint Co., Ambler, Pa.
Closin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Cocheo—Belting. Williams & Son, I. B., Dover, N. H.
Colalloy—Couplings, nipples, pipe. Colonial Alloys Co. Metals Div., Philadelphia, Pa.
Coldjet—Unit coolers, air conditioning units. Industrial Mfg. & Engineering Co., Chicago, Ill.
Coltemp—Insulation. Badham Insulation Co., Inc., Birmingham, Ala.
Columbia—Odor adsorbers. Carbide and Carbon Chemicals Div., Union Carbide and Carbon Corp., New York, N. Y.
Columbia—Ventilators. E. E. Souther Iron Co., St. Louis, Mo.
Combustioneer—Stokers. Steel Products Engineering Co., Springfield, O.
Comet—Fans, unit heaters. New York Blower Co., Chicago, Ill.
Comfort Control—Temperature regulators. Bell & Gossett Co., Morton Grove, Ill.
Comfort Master—Barometric controls. A-P Controls Corp., Milwaukee, Wis.
Comfort Panel—Radiation. Columbus Radiator Co., McKeesport, Pa.
Comfortrol—Switches. Holcomb & Hoke Mfg. Co., Inc., Indianapolis, Ind.
Comfostat—Thermostats. Johnson Service Co., Milwaukee, Wis.
Co-Min-Co—Insulating cement. United States Mineral Wool Co., South Milwaukee, Wis.
Compact-Boilers. Titusville Iron Works Co., The, Titusville, Pa.
Compass—Belting. Goodyear Tire & Rubber Co., Akron, O.
Compound Lever—Hand shears and snips. Bartlett Mfg. Co., Detroit, Mich.
Conco—Boiler cleaning compounds, water treatment. Continental Products Co., Euclid, O.
Condor—Belting, V belts, pipe. Raybestos-Manhattan, Inc., Passaic, N. J.
Condo-Vac—Vacuum pumps. Chicago Pump Co., Chicago, Ill.
Coni-Vane—Ventilators. Allen Ventilator Div., Production Planning Co., Rochester, Mich.
Conomotors—Duct and valve operators. Conoflow Corp., Philadelphia, Pa.
Conseco—Water chillers, tube cleaners, coils, compressors, condensers, oil coolers, dryers, heat exchangers, filters, headers, water heaters, joints, preheaters, pumps, separators, superheaters, tanks, cooling towers. Condenser Service & Engineering Co., Inc., Hoboken, N. J.
Consolidated—Valves. Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Con-Tac-Tor—Switches. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Convect-O-Base—Baseboard radiation. Minimite Co., Chicago, Ill.
Convect-O-Fin—Fin tube radiation, tubing, Minimite Co., Chicago, Ill.
Convector—Humidifiers. Maid-O'-Mist., Inc., Chicago, Ill.
Converto—Roof ventilators. Ammerman Co., C. L., Minneapolis, Min.
Conveyoflo—Conveyors. Builders-Providence, Inc., Providence, R. I.
Conveyor—Pulleys and sheaves. The American Pulley Co., Philadelphia, Pa.
Coolair—Fans, louvers and shutters, ventilators, ventilator units. American Coolair Corp., Jacksonville, Fla.
Cool-A-Matic—Air conditioning units. Automatic Firing Corp., St. Louis, Mo.
Cooler-Aire—Window type cooling units. Baltimore Porcelain Steel Corp., Baltimore, Md.
Cooleraire—Air conditioning units. Payne Furnace Co., Monrovia, Calif.
Coolero—Ventilators. Hirschman-Pohle Co., Inc., LeRoy, N. Y.
Coolite—Windows. Mississippi Glass Co., New York, N. Y.
Coolmaster—Unit coolers. Kramer Trenton Co., Trenton, N. J.
Cool Spot—Propeller fans. Signal Electric Mfg. Co., Menominee, Mich.
Copaltite—Cement and compounds, gaskets. National Engineering Products, Inc., Washington, D. C.
Copes—Governors, regulators, steam desuperheaters, valves, water alarms, indicators. Northern Equipment Div., Continental Foundry & Machine Co., Erie, Pa.
Cop-R-Loy—Sheets. Wheeling Steel Corp., Wheeling, W. Va.
Copr-Tube—Fittings. Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Coravol—Corrosion treatment. Western Chemical Co., Kansas City, Mo.
Cor-In Galvanode—Electrolytic devices. Rotometals, Inc., San Francisco, Calif.
Cornelius—Air compressors and regulators North Penn Co., New York, N. Y.
Corosex—Water treatment. Research Product Corp., Madison, Wis.
Corrodicide—Water treatment. Metropolita Refining Co., Inc., Long Island City, N. Y
Corrodine—Corrosion inhibition. Metropolita Refining Co., Inc., Long Island City, N. Y
Cotoid—Coatings. Lithgow Corp., Chicago, Ill.
Cottrell—Dust collectors. Research Corp New York, N. Y.
Cottrell—Dust collectors. Western Precipitation Corp., Los Angeles, Calif.
Coxe—Stokers. Combustion Engineering-Superheater, Inc., New York, N. Y.
Co-Z-Air—Electric radiators. Conco Engineering Wks., Div. of H. D. Conkey & Co Mendota, Ill.
Crescent—Boiler gage cocks, Wright-Austi Co., Detroit, Mich.
Crescent—Furnaces. Century Engineerin Corp., Cedar Rapids, Ia.
Croloy—Pipe, tubes, and tubing. Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Cromaloy—Solder. Linde Air Products Co The, Unit of Union Carbide & Carbo Corp., New York, N. Y.
Cross-Flo—Dehydrators. Remco, Inc., Zel enople, Pa.
Crown—Cement and compounds. Colebrook & Sons, Inc., W. H., Syracuse, N. Y.
Crystals—Enamels and lacquers. Hilo Varnis Corp., Brooklyn, N. Y.
Cushion-Cradled—Burners. Century Engineering Corp., Cedar Rapids, Ia.
Customair—Air conditioning units. Tran Co., The, La Crosse, Wis.
Custom Built—Unit air conditioners. Bake Refrigeration Corp., South Windham, Me.
Cut Master—Vertical turret lathes. Bullard Co., The, Bridgeport, Conn.
Cutno—Packing. Greene, Tweed & Co., North Wales, Pa.
Cycloidal—Air washers. Blower Application Co., Milwaukee, Wis.
Cycoil—Filters. American Air Filter Co., Louisville, Ky.
Cyclone—Exhaust heads. Wright Austin Co., Detroit, Mich.
Cyclops—Roller bearings. Roller Bearing Co. of America, Trenton, N. J.

DFN—Dehydrators, filters. McIntire Connector Co., Newark, N. J.
DFN Du-cal Drierite—Dehydrators, McIntire Connector Co., Newark, N. J.
DH—Ball bearings. Dodge Mfg. Corp., Mishawaka, Ind.
D.I.P.—Insulation, piping. Durant Insulated Pipe Co., Palo Alto, Calif.
DV—V-belt drives. Dodge Mfg. Corp., Mishawaka, Ind.
Daptoblu—Gas burners. Beck Engineering Combustion Kompany, St. Louis, Mo.
Dart—Unions. Fairbanks Co., New York, N. Y.
Dawnblast—Unit heaters. Sturtevant Co., B.

F., Div. of Westinghouse Electric, Boston, Mass.
Day-Nite Acratherm—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Day-Steel—Pulleys. Dayton Rubber Co., Dayton, O.
Dean—Cleaners. Pierce Co., Wm. B., The, Buffalo, N. Y.
Debecote—Coatings. Debevoise Co., The, Brooklyn, N. Y.
Deflecto—Ventilators. Day Co., The, Minneapolis, Minn.
Deflecto-Grilles—Grilles. United States Air Conditioning Corp., Minneapolis, Minn.
Defrostolator—Hot gas defrosting systems. Tenney Engineering, Inc., Newark, N. J.
Demandtrol—Valves. Gold Top Heating, Inc., Butte, Mont.
Demon Air-Set—Refractories. Plibrico Jointless Firebrick Co., Chicago, Ill.
Densitron—Alarms. Ripley Co., Inc., Middletown, Conn.
Deoxidine—Cleaning compounds. American Chemical Paint Co., Ambler, Pa.
Dereka—Protective coatings. Debevoise Co., The, Brooklyn, N. Y.
Desert Air—Heaters, burners. Central States Mfg. Co., Inc., Arkansas City, Kan.
Desmond-Simplex—Pipe vises. Desmond-Stephan Mfg. Co., Urbana, O.
Desomatic—Dehumidifiers. Daly, Merritt & Sullivan, Inc., Falls Church, Va.
De-Sta-Co.—Fan housings, pipe clamps, valves. Detroit Stamping Co., Detroit, Mich.
Detroit—Traps. Nason Co., Detroit, Mich.
Detroit LoStoker—Stokers. Detroit Stoker Co., Detroit, Mich.
Detroit Rotograte Stoker—Stokers. Detroit Stoker Co., Detroit, Mich.
Detroit Rotostoker—Stokers. Detroit Stoker Co., Detroit, Mich.
Detroit Unistoker—Stokers. Detroit Stoker Co., Detroit, Mich.
Dexter—Valve reseaters, air separators, steam traps. Leavitt Machine Co., Orange, Mass.
Di-Acro—Benders, brakes, machines, shears. O'Neil Irwin Mfg. Co., Lake City, Minn.
Dial—Regulators. Parker-Kalon Corp., New York, N. Y.
Dialco—Pilot and signal lights. Dial Light Co. of America, Inc., New York, N. Y.
Dialon—Radiator valves, Bridgeport Brass Co., Bridgeport, Conn.
Diamond—Cement. Green Fire Brick Co., Mexico, Mo.
Diamond—Compounds, enamels and lacquers. Thompson & Co., Oakmont, Pa.
Diamond Fibre—Gaskets. Continental Diamond Fibre Co., Newark, Del.
Diamond H—Switches, thermostats, regulators, relays. Hart Mfg. Co., Hartford, Conn.
Diaphlex—Bellows, relays, solenoids, and switches. Cook Electric Co., Chicago, Ill.
Dia-Seal—Valves. Imperial Brass Mfg. Co., Chicago, Ill.
Dickbelt—Belting and drives. Dick Co., Inc., R. & J., Passaic, N. J.
Dickinson Ferrocast—Exhaust heads, ventilators. Dickinson, Aeolus, Chicago, Ill.
Dickrope—V belts and drives. Dick Co., Inc., R. & J., Passaic, N. J.
Dickvalve—Valves. Dick Co., Inc., R. & J., Passaic, N. J.
Diesel American—Oil burners. Diesel Oil Burner Corp. of New York, Jamaica, Long Island, N. Y.
Dieselite—Corrosion prevention. Metropolitan Refining Co., Inc., Long Island City, N. Y.
Dilecto—Plastic pipe. Continental Diamond Fibre Co., Newark, Del.
Direct—Pipe fittings and flanges. Straight Line Foundry & Machine Corp., Direct Separator Div., The, Syracuse, N. Y.
Directrol—Vanes. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
Discfin—Cooling surface. General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
Disc-Loc—Registers. Knowles Mushroom Ventilator Co., Upper Montclair, N. J.
Disseminator—Compounds. Ampion Corp., Long Island City, N. Y.
Distributor—Radiation. Kehm Corp., The, Chicago, Ill.
Divco—Pipe and tubing, sheets, solder, valves. Division Lead Co., Chicago, Ill.
Dix—Universal joints. Lovejoy Flexible Coupling Co., Chicago, Ill.
Dixigas—Gas welding rod. Atlantic Steel Co., Atlanta, Ga.
Dixisteel—Pipe hangers and supports, angles, flanges. Atlantic Steel Co., Atlanta, Ga.
Do-All—Combination hammer and drill. Wodack Electric Tool Corp., Chicago, Ill.
Dominion—Gaskets, packing. Darcoid Co., Inc., New York, N. Y.
Dorex—Adsorbers. W. B. Connor Engineering Corp., Danbury, Conn.
Double Check—Boiler compounds. Hampton-Cross Co., The, Louisville, Ky.
Double Diamond—Hygrometers, recorders, psychrometers. H-B Instrument Co., Philadelphia, Pa.
Double-Flow—Cooling towers. Marley Co., Inc., The, Kansas City, Kan.
Double-Seal—Copper tube fittings. Hays Mfg. Co., Erie, Pa.
Double U—Packing. Wayne Davies & Co., Westboro, Mass.
Dowmetal—Sheets, tubing, welding rod. Dow Chemical Co., Midland, Mich.
Downblast—Unit heaters. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Dowtherm—Process heating systems. Dow Chemical Co., The, Midland, Mich.
Draft-A-Justor—Draft controls. Preferred Utilities Mfg. Corp., New York, N. Y.
Draftender—Regulators. Penn Electric Switch Co., Goshen, Ind.
Draft-O-Stat—Barometric controls. Hotstream Heater Co., Cleveland, O.
Draftrite—Gages. Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Draftrite—Gages. Cole-Sewell Engineering Co., St. Paul, Minn.
Drainator—Traps. Coe Mfg. Co., Painesville, O.
Drain-Dri—Sump pumps. Yeomans Bros. Co., Chicago, Ill.
Draintrol—Traps. Schaub Engineering Co., Fred H., Chicago, Ill.
Dresserell—Fittings. Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Dricooler—Heat exchangers. Marley Co., Inc., The, Kansas City, Kan.
Drift Retriever—Cooling towers. Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Dri-Pipe—Insulation. Mystik Adhesive Products Div., Chicago Show Printing Co., Chicago, Ill.
Dripump—Pumps. Peerless of America, Inc., Chicago, Ill.
Drive-IT—Hangers and supports, welders. Powder Power Tool Corp., Portland, Ore.
Dri-vent—Radiator air valves. Frank D. Riggio Co., Rutherford, N. J.
Dry-Ex—Water chillers. Acme Industries, Inc., Jackson, Mich.
Dryfol—Building insulation. Reflectal Corp., New York, N. Y.
Dry-Ice—Refrigerants. Pure Carbonic, Inc., Div. of Air Reduction Co., Inc., New York, N. Y.
Drynamic—Dehumidifiers. Cargocaire Engineering Corp., New York, N. Y.
Dry-paC—Insulation. Ric-wiL Co., Cleveland, O.
Dryvin—Expansion bolts. Star Expansion Bolt Co., New York, N. Y.
Dualarc—Arc Welders. Electric Arc, Inc., Newark, N. J.
Dual-Clone—Dust collectors. Day Co., The, Minneapolis, Minn.
Dual-Dial—Gages. Rochester Mfg. Co., Inc., Rochester, N. Y.
Dual-A-Fire—Burners. Automatic Firing Corp., St. Louis, Mo.
Dualene—Fuel oil treatment. Allen Co., Robert G., Mechanicsville, N. Y.
Dualsteel—Unions. Rockwood Sprinkler Co., Worcester, Mass.
Dualvent—Roof ventilators. Octagon Ventilator Co., Chicago, Ill.
Duboth—Boiler water treatment. Metropolitan Refining Co., Inc., Long Island City, N. Y.
Duclone—Dust collectors. Ducon Co., Mineola, N. Y.
Duco—Enamels and lacquers, du Pont de Nemours & Co., (Inc.), E. I., Fabrics & Finishes Dept., Wilmington, Del.
Ductatherm—Thermostats. Mercoid Corp., The, Chicago, Ill.
Ducturns—Vanes. Tuttle & Bailey, Inc., New Britain, Conn.
Ductype—Fans. South Bend Air Products, Inc., South Bend, Ind.
Dulrae—Electrical radiant heating conductors. Crittall Radiant Heating, Inc., Richard, New York, N. Y.
Dulux—Enamels and lacquers. du Pont de Nemours & Co., (Inc.) E. I., Fabrics & Finishes Dept., Wilmington, Del.
Dum Dum—Sealing compounds. Arco Co., The, Cleveland, O.
Duo Blo—Air heaters. American Furnace Co., St. Louis, Mo.
Duoflo—Pipe line strainers. Sheffler-Gross Co., Philadelphia, Pa.
Duo-Stat—Heating systems, thermostats. Johnson Service Co., Milwaukee, Wis.
Duotrol—Regulators. Automatic Control Co., St. Paul, Minn.
Duplex—Insulation. Keasbey & Mattison Co., Ambler, Pa.
Duplex—Pipe cutting machines. Bignall & Keeler Div., John Ramming Machine Co., St. Louis, Mo.
Durabel—Coatings. Perolin Co., Inc., Chicago, Ill.
Durabilt—Observation ports, conveyors. Chicago Fire Brick Co., Chicago, Ill.
DuraBilt—Registers. Auer Register Co., Cleveland, O.
Duradiant—Gas burners. Selas Corp. of America, Philadelphia, Pa.
Dura-Flex—Registers. Auer Register Co., Cleveland, O.
Duraflex—Stokers. Canton Stoker Corp., Canton, O.
Dura-Line—Registers. Auer Register Co., Cleveland, O.
DuraSpeed—Sprinkler heads. Grinnell Co., Inc., Providence, R. I.
Duratex—Protective coatings. National Pipe Coatings, Inc., Los Angeles, Calif.
Durco—Fans, fittings, pipe, valves. Duriron Co., Inc., Dayton, O.
Durcopump—Fans, fittings, pipe, valves. Duriron Co., Inc., Dayton, O.
Durex—Bearings. Moraine Products Div., General Motors Corp., Dayton, O.
Durichlor—Fans, fittings, pipe, valves. Duriron Co., Inc., Dayton, O.
Duridine—Protective coatings. American Chemical Paint Co., Ambler, Pa.
Durimet—Fans, fittings, pipe, valves. Duriron Co., Inc., Dayton, O.
Durobrace—Pulleys and sheaves. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Duro Gloss—Steel sheets. Jessop Steel Co., Washington, Pa.
Dustex—Dust collectors. Dust Filter Co., Chicago, Ill.
Dust King—Dust collectors. Dust Filter Co., Chicago, Ill.
Dustkop—Dust collectors. Aget-Detroit Co., Ann Arbor, Mich.
Dust-Stop—Air Filters. Owens-Corning Fiberglas Corp., Toledo, O.
Dust-Trap—Filters. Morf Industries, Inc., Staten Island, N. Y.
Dustube—Dust collectors. American Wheelabrator & Equipment Corp., Mishawaka, Ind.
Dutch Boy—Solder. National Lead Co., New York, N. Y.
Duxbak—Leather belting and packing. Schieren Co., Chas. A., New York, N. Y.
Dux-Sulation—Insulation. Grant Wilson, Inc., Chicago, Ill.
Dynaflow—Fans. South Bend Air Products, Inc., South Bend, Ind.
Dyna-Line—Electric motors. Brown-Brockmeyer Co., Inc., Dayton, O.
Dynamaster—Recorders. Bristol Co., The, Waterbury, Conn.
Dyna-Speed—Electric motors. Brown-Brockmeyer Co., Inc., Dayton, O.
Dynetric—Balancing equipment. Gisholt Machine Co., Madison, Wis.

E.A.D.—Motors. Eastern Air Devices, Inc., Brooklyn, N. Y.
E-C—V belts. Goodyear Tire & Rubber Co., Akron, O.
E C & M—Motor controls, switches. Electric Controller & Mfg. Co., Cleveland, O.
EMD—Blowers. L. J. Wing Mfg. Co., Linden, N. J.
E-Z—Registers, regulators. Acme Mfg. Co., Philadelphia, Pa.
E.Z.—Hangers or brackets, soot destroyers. Healy Ruff Co., St. Paul, Minn.
Eastern—Tanks. Case & Son Mfg. Co., W. A., Buffalo, N. Y.
Easy-Flo—Solder. Handy & Harman, New York, N. Y.
Ebko—Conduit, exchangers, pipe. Kaiser Co., E. B., Chicago, Ill.
Eclipse—Reciprocating compressors. Frick Co., Waynesboro, Pa.
Econofeed—Pumps, systems. Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
Econ-O-Matic—Motor bases. American Pulley Co., The, Philadelphia, Pa.
Economist—Boilers. Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
Economite—Commercial and industrial gas burners. Mid-Continent Metal Products Co., Chicago, Ill.
Economizer—Nozzles. Bahnson Co., Winston-Salem, N. C.
Economy—Boilers, heaters. International Heater Co., Utica, N. Y.
Economy—Regulators. Dockson Corp., Detroit, Mich.
Economy—Unit ventilators. Arex Co., Chicago, Ill.
Econostat—Heating systems. Barber-Colman Co., Rockford, Ill.
Econotherm—Boilers. Dutton Boiler Div., Hapman-Dutton Co., Kalamazoo, Mich.
Econovent—Ventilators. Western Engineering & Mfg. Co., Los Angeles, Calif.
Edgeseal—Air filters. Wilson & Co., Inc., Chicago, Ill.
Edgetallic—Gaskets. Darcoid Co., Inc., New York, N. Y.
Effico—Ventilators. Hirschman-Pohle Co., Inc., LeRoy, N. Y.
"88"—Pipe covering. Eagle-Picher Co., Cincinnati, O.
Elastic Metallic—Packing. Austin-Mason Co., Everett, Mass.
Elasto Rib—Vibration isolating bases. Korfund Co., Inc., Long Island City, N. Y.
Electranik—Indicator-controllers. Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Electric Filter Watchman—Gages. Herbusch Corp., The, St. Louis, Mo.
Electrifugal—Centrifugal pumps. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electriglass—Conductors. Appleman Glass

Works, Bergenfield, N. J.

Electro-Airmat—Air cleaners. American Air Filter Co., Inc., Louisville, Ky.

Electro-Cell—Air cleaners. American Air Filter Co., Inc., Louisville, Ky.

Electroflo—Valves. Hays Mfg. Co., Erie, Pa.

Electrofluid—Hydraulic speed changers. Link-Belt Co., Philadelphia, Pa.

Electro-Hot—Heaters. Red Spot Electric Co., Tacoma, Wash.

Electro-Mist Collector—Air cleaners. American Air Filter Co., Inc., Louisville, Ky.

Electro-Pl—Air cleaners. American Air Filter Co., Inc., Louisville, Ky.

Electro-Rod—Pipe cleaning machines. Spartan Tool Co., Chicago, Ill.

Electro-Sheet—Sheets. American Brass Co., Waterbury, Conn.

Electroweld—Welders. Electric Arc., Inc., Newark, N. J.

Electro-Wind—Ventilators. Allen Ventilator Div., Production Planning Co., Rochester, Mich.

Electrunite—Stainless steel tubing and pipe, tubing benders. Republic Steel Corp., Steel & Tubes Div., Cleveland, O.

Elesco—Superheaters. Combustion Engineering-Superheater, Inc., New York, N. Y.

Elgex—Steam system treatment. Elgin Softener Corp., Elgin, Ill.

Elgin—Arc welders. Borm Mfg. Co., Elgin, Ill.

Elgin—Louvers and shutters. Elgo Shutter & Mfg. Co., Detroit, Mich.

Elm—Dampers. Elgo Shutter & Mfg. Co., Detroit, Mich.

Elsco—Blowers, compressors, pumps, valves. Electric Sprayit Co., The, Sheboygan, Wis.

Embee—Cement and compounds. Montgomery Bros., San Francisco, Calif.

Emco—Meters, regulators. Pittsburgh Equitable Meter Div., Rockwell Mfg. Co., Pittsburgh, Pa.

Emergency—Traps. Wright-Austin Co., Detroit, Mich.

Empire—Water meters. Pittsburgh Equitable Meter Div., Rockwell Mfg. Co., Pittsburgh, Pa.

Enamel-Kote—Enamels and lacquers. Acme White Lead & Color Works, Detroit, Mich.

Enco—Burners, regulators, cooling units. Engineer Co., New York, N. Y.

Enduro—Sheets, tubing, pipe. Republic Steel Corp., Steel & Tubes Div., Cleveland, O.

Enduro—Unions. Jefferson Union Co., Inc., New York, N. Y.

Entrained Combustion—Gas burners. Mettler Co., Inc., The, Los Angeles, Calif.

Equatemp—Balancing valves. Ohio Brass Co., Mansfield, O.

Equiflo—Valves. Grinnell Co., Inc., Providence, R. I.

Eroduct—Insulation. Ehret Magnesia Mfg. Co., Valley Forge, Pa.

Esco—Fittings, flanges, pipe, tubing. Electric Steel Foundry Co., Portland, Ore.

Ermeto—Fittings. Weatherhead Co., The, Cleveland, O.

Esna—Nuts. Elastic Stop Nut Corp. of America, Union, N. J.

Esso—Oil burners, heaters. Gilbert & Barker Mfg. Co., West Springfield, Mass.

Esso Bond—Cement, refractories. Ramtite Co., The, Chicago, Ill.

Eutec-Arc—Arc welders, welding and cutting apparatus. Eutectic Welding Alloys Corp., New York, N. Y.

EuteCrod—Welding compounds, rods, solder. Eutectic Welding Alloys Corp., New York, N. Y.

Eutector—Welding compounds. Eutectic Welding Alloys Corp., New York, N. Y.

EutecTorch—Torches, welding and cutting apparatus. Eutectic Welding Alloys Corp., New York, N. Y.

EutecTrode—Welding electrodes. Eutectic Welding Alloys Corp., New York, N. Y.

Evactor—Pumps. Croll-Reynolds Engineering Co., Inc., New York, N. Y.

Evapotrol—Valves. Alco Valve Co., St. Louis, Mo.

Evanaction—Valves. Taylor Instrument Companies, Rochester, N. Y.

Everflex—Hose, coils, and tubing. Everhot Products Co., Chicago, Ill.

Everjet—Coatings, Barrett Div., Allied Chemical & Dye Corp., New York, N. Y.

Everlasting—Bolts and studs. H. M. Harper Co., Morton Grove, Ill.

Eversharp—Cutters. Everhot Products Co., Chicago, Ill.

Evertite—Clamps. Everhot Products Co., Chicago, Ill.

Evrtyte—Valves. Strong, Carlisle & Hammond Co., Cleveland, O.

Excel—Unions. Jefferson Union Co., Inc., New York, N. Y.

Excelsior—Pumps. Foster Pump Works, Inc., Brooklyn, N. Y.

Excelso—Water heaters. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.

Exhaustair—Fans. New York Blower Co., Chicago, Ill.

Exidust—Dust collectors. Lamson Corp., Blower Div., Syracuse, N. Y.

Extra Dry Esotoo—Liquid sulphur dioxide. Virginia Smelting Co., West Norfolk, Va.

Eye-Hye—Gages, indicators. Reliance Gauge Column Co., Cleveland, O.

E-Z—Cutters. Quijada Tool Co., Inc., Los Angeles, Calif.

Ez-arc—Arc welders. Will-Weld Mfg. Co., Inc., Omaha, Neb.

E-Z-On—Regulators. Gerrett Corp., M. A., Milwaukee, Wis.

E-Z See—Glasses. Remco, Inc., Zelienople, Pa.

Ezy-Kleen—Strainers. Blackmer Pump Co., Grand Rapids, Mich.

F & E—Stokers. Flynn & Emrich Co., Baltimore, Md.

FS—Bellows. Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Knoxville, Tenn.

F & T—Boilers. Farrar & Trefts, Buffalo, N. Y.

Fabrikated—Grilles, registers. Independent Register Co., Cleveland, O., New York, N. Y.

Fairco-Braze—Valves. Fairbanks Co., New York, N. Y.

Faircoseal—Valves. Fairbanks Co., New York, N. Y.

Fan-Air—Gas burners. Mettler Co., Inc., The, Los Angeles, Calif.

Fanmix—Burners. Coppus Engineering Corp., Worcester, Mass.

Fan-Pac—Fans. DeBothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.

Far-Air—Air conditioning units, filters, humidifiers. Farr Co., Los Angeles, Calif.

Farragut—Packing. Darcoid Co., Inc., New York, N. Y.

Fast's—Couplings. Koppers Co., Inc., Pittsburgh, Pa.

Favorite—Ratchet wrenches. Greene, Tweed & Co., North Wales, Pa.

Featherfin—Heating and cooling surface. Wing Mfg. Co., L. J., Linden, N. J.

Featherweight—Unit heaters. Wing Mfg. Co., L. J., Linden, N. J.

Feed-Rator—Chemical feeders. Fischer & Porter Co., Hatboro, Pa.

Fel-Pro—Gaskets, packing. Felt Products Mfg. Co., Chicago, Ill.

Felt Cote—Metal Sheets. American Steel Band Co., Pittsburgh, Pa.

Fenn's Rotary—Ventilators. Waverly Heating Supply Co., Boston, Mass.

Fenox—Compounds. Halowax Products Div., Union Carbide & Carbon Corp., New York, N. Y.

Ferrenewo—Valves. Lunkenheimer Co., Cincinnati, O.

Ferrodex—Compounds. MacDermid Chemical Co., Bristol, Conn.

Ferro-Therm—Insulation. American Flange & Mfg. Co., New York, N. Y.

Ferroweld—Electrodes. Lincoln Electric Co., Cleveland, O.

Fiberglas—Insulation. Owens-Corning Fiberglas Corp., Toledo, O.

Fiberlite—Insulation. Insulite Co., Minneapolis, Minn.

Fibron—Plastic tubing. Irvington Varnish & Insulator Co., Irvington, N. J.

Filmflo—Deaerators. Croll-Reynolds Engineering Co., Inc., New York, N. Y.

Filterpure—Cooling surface, unit coolers. Betz Corp., Hammond, Ind.

Fil-Thru—Gages. Applied Mechanics Co., Boston, Mass.

Filt-R-Stil—Water treatment. American Cyanamid & Chemical Corp., New York, N. Y.

Filter Watchman—Air filter gages. Research Products Corp., Madison, Wis.

Finco—Finned tubing. Fintube Coil Corp., Alhambra, Calif.

Findlay—Stokers. Central Rubber & Steel Corp., Findlay, O.

Fine-Screen—Strainers. Yarnall-Waring Co., Philadelphia, Pa.

Fin-Fans—Oil coolers. Fluor Corp., Ltd., The, Los Angeles, Calif.

Fin-Flex—Registers. Auer Register Co., Cleveland, O.

Finfold—Cooling surface. Pleasantaire Corp., Washington, D. C.

Finmaster—Radiation. Smith Co., Inc., H. B., The, Westfield, Mass.

Finnflex—Bases and pads, absorbers. Finn & Co., New York, N. Y.

Firecrete—Refractories. Johns-Manville, New York, N. Y.

Firefoil—Insulating panel. Carey Mfg. Co., Philip, Lockland, Cincinnati, O.

Fire-Guard—Industrial stokers. Eddy Stoker Corp., Chicago, Ill.

Fire-Hearth—Refractories. Fireline Stove & Furnace Lining Co., Chicago, Ill.

Fireite—Furnace cement; refractories. Johns-Manville, New York, N. Y.

Fireset—Refractories. Walsh Refractories Corp., St. Louis, Mo.

Fire Tender—Stokers. Holcombe & Hoke Mfg. Co., Inc., Indianapolis, Ind.

Fireye—Flame failure controls, systems. Combustion Control Corp., Cambridge, Mass.

Firma—Ventilators. Hirschman-Pohle Co., Inc., LeRoy, N. Y.

Firomatic—Filters, gages, links, switches, valves. Morse-Smith-Morse, Inc., Watertown, Mass.

Flame Buster—Spray nozzles. Grinnell Co., Inc., Providence, R. I.

Flame-otrol—Controls. Wheelco Instruments Co., Chicago, Ill.

Flange-Jacks—Separators. Williams & Co., J. H., Buffalo, N. Y.

Flaremaster—Benders. Everhot Products Co., Chicago, Ill.

Flash-Off—Welding compounds. Acme White Lead & Color Wks., Detroit, Mich.

Flat-Belt—Pulleys and sheaves. The American Pulley Co., Philadelphia, Pa.

Flatjet—Spray nozzles. Spraying Systems Co., Bellwood, Ill.

Fleetweld—Welding electrodes. Lincoln Electric Co., Cleveland, O.

Fleetwelder—Welders. Lincoln Electric Co., Cleveland, O.

Fleet-X—Enamels and lacquers. Acme White Lead & Color Works, Detroit, Mich.

Flex—Nipples. Techniflex Corp., Port Jervis, N. Y.

Flexarc—Arc welders. Westinghouse Electric Corp., Pittsburgh, Pa.

Flexaust—Hose. American Ventilating Hose Co., New York, N. Y.

Flexcord—Drives. Gates Rubber Co., Denver, Col.

Flexfast—Hose clamps. Flexible Tubing Corp., Branford, Conn.

Flexiblac—Protective coatings. Samuel Cabot, Inc., Boston, Mass.

Flexidur—Nozzles. Bahnson Co., Winston-Salem, N. C.

Flexfelt—Insulation. National Gypsum Co., Buffalo, N. Y.

Flex-i-liner—Rotary pumps. Vanton Pump Corp., New York, N. Y.

Flexiwound—Gaskets. Azor Corp., Irvington, N. J.

Flexloc—Lock nuts. Standard Pressed Steel Co., Jenkintown, Pa.

Flexodisc—Expansion joints. Croll-Reynolds Engineering Co., Inc., New York, N. Y.

Flexon—Bellows. Chicago Metal Hose Corp., Maywood, Ill.

Flexpansion—Fittings and hose. Techniflex Corp., Port Jervis, N. Y.

Flexpin—Couplings. Smith & Serrell, Inc., Newark, N. J.

FlexRing—Couplings. Smith & Serrell, Inc., Newark, N. J.

Flextite—Gate valves. Ohio Brass Co., Mansfield, O.

Flex-Tube—Analyzers, gages, manometers. Dwyer Mfg. Co., F. W., Chicago, Ill.

Floatrol—Switches, regulators. Automatic Control Co., St. Paul, Minn.

Flo-Controls—Fittings. W-H Engineering Co., Chicago, Ill.

Floetless—Sump pumps. Imperial Brass Mfg. Co., Chicago, Ill.

Flo-Gage—Meters. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.

Flo-Klean—Filters, strainers. Cuno Engineering Corp., Meriden, Conn.

Flo-Master—Valves. General Heaters & Regulators Co., Chicago, Ill.

Flo-Matic—Stokers. American Coal Burner Co., Chicago, Ill.

Florite—Air velocity meters. Bacharach Industrial Instrument Co., Pittsburgh, Pa.

Flo-Scope—Meters. Selas Corp. of America, Philadelphia, Pa.

Flotrol—Humidifiers, valves. Cleveland Humidifier Co., Cleveland, O.

Flo-watch—Flow meters. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.

Flow-Cold—Water chillers. Acme Industries, Inc., Jackson, Mich.

Flowline—Pipe fittings. Welding Fittings Corp., New Castle, Pa.

Flowrator—Meters. Fischer & Porter Co., Hatboro, Pa.

Flualyzer—Analyzers. Engelhard, Inc., Chas., Newark, N. J.

Fluidyne—Pumps. Peerless Pump Div., Food Machinery and Chemical Corp., Los Angeles, Calif.

Flush-Kleen—Sewage ejectors and pumps. Chicago Pump Co., Chicago, Ill.

Flux-Stik—Solder and fluxes. Lake Chemical Co., Chicago, Ill.

Foambuster—Compounds. Cannon Chemical Co., Inc., Cambridge, Mass.

Foamglas—Insulation. Armstrong Cork Co., Lancaster, Pa.

Foamglas—Insulation. Pittsburgh Corning Corp., Pittsburgh, Pa.

Foamglas—Insulation. Pittsburgh Plate Glass Co., Pittsburgh, Pa.

Force-Flo—Circulators, fittings, heaters, regulators, tanks. Kehm Corp., The, Chicago, Ill.

Form-A-Gasket—Cement and compounds. Permatex Co., Inc., Brooklyn, N. Y.

Formet—Water treatment. Perolin Co., Inc., Chicago, Ill.

4-Point—Control systems. Perfex Corp., Milwaukee, Wis.

"400" Series—Heaters. Fitzgibbons Boiler

Co., Inc., New York, N. Y.
4-Star—Adhesive tape. Johns-Manville, New York, N. Y.
Fracto-Crete—Refractories. Ramtite Co., The, Chicago, Ill.
Francke—Flexible couplings. Waldron Corp., John, New Brunswick, N. J.
Francke Parts—Couplings. Smith & Serrell, Inc., Newark, N. J.
Franzite—Enamels and lacquers. Hilo Varnish Corp., Brooklyn, N. Y.
Free-Aire—Air conditioning units, heaters. Kehm Corp., The, Chicago, Ill.
Free-Flow—Ventilators. Burt Mfg. Co., Akron, O.
Fre-Flo—Strainers. Fisher Governor, Marshalltown, Ia.
Fresh Air Maker—Propeller fans, units, ventilators. Schwitzer-Cummins Co., Indianapolis, Ind.
Frevent—Valves. Bridgeport Brass Co., Bridgeport, Conn.
Frictionized—Belting. Baldwin Belting, Inc., New York, N. Y.
Frigid—Propeller fan blades and fans, dehumidifiers, welding fume exhausters, paint spray booths, air conditioning units, ventilators. Circulators & Devices Mfg. Corp., Brooklyn, N. Y.
Frigistat—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Frigitower—Cooling towers. Thermal Industries, Indio, Calif.
Frost-Tite—Fittings. Remco, Inc., Zelienople, Pa.
Fuelguard—Commercial and industrial burners. Fuelguard Co., Dallas, Tex.
Fuel Saver—Boilers. International Boiler Works, East Stroudsburg, Pa.
Fuelsaver—Boilers. Columbia Radiator Co., McKeesport, Pa.
Fueltone—Fuel oil treatment. Ampion Corp., Long Island City, N. Y.
Fulflo—Filters. Commercial Filters Corp., Boston,Mass.
Fulljet—Spray nozzles. Spraying Systems Co., Bellwood, Ill.
Fulscope—Recorders, recorder-controllers, regulators. Taylor Instrument Companies, Rochester, N. Y.
Fuseair—Air diffusers. Aladdin Heating Corp., Oakland, Calif.
Fusomatic—Links. Preferred Utilities Mfg. Corp., New York, N. Y.
Fybr-Tech—Gaskets and sheets. Technical Ply-Woods, Chicago, Ill.
Fyr-Feeder—Stokers. American Coal Burner Co., Chicago, Ill.
Fyrite—Analyzers. Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Fyritec—Recorders. Cole-Sewell Engineering Co., St. Paul, Minn.

GB—Fans. General Blower Co., Morton Grove, Ill.
G. B. C.—Fans, gages, regulators. General Blower Co., Inc., Philadelphia, Pa.
G-E—Compressors, condensers, thermostats. General Electric Co., Air Conditioning Dept., Bloomfield, N. J.
G-Fin—Cooling and heating surface. Griscom-Russell Co., The, New York, N. Y.
GIL—Filters, regulators. Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
GIL Governoret—Valves. Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
GIL No-Hum—Check valves. Gas & Oil Industry Laboratories, Inc., Irvington, N. J.
G. P.—Smoke density recorders, analyzers, combustion control systems. General Power Plant Corp., New York, N. Y.
G-R—Aftercoolers, oil coolers, water chillers, regulators. Griscom-Russell Co., The, New York, N. Y.
Gaco—Couplings. Gates Engineering Co., Wilmington, Del.
Gaco-Neoprene—Coatings, fittings, pipe. Gates Engineering Co., Wilmington, Del.
Galongage—Gages. Applied Mechanics Co., Boston, Mass.
Galv-O-Zinc—Coatings. Blue Ridge Talc Co., Inc., Henry, Va.
Gasgun—Torches. Century Aircraft, Los Angeles, Calif.
Gas-A-Fire—Burners. Automatic Firing Corp., St. Louis, Mo.
Gast—Filters, separators. Johnson Corp., The, Three Rivers, Mich.
Gasteam—Radiators. Clow & Sons, James B., Chicago, Ill.
Gasweld—Torches, welding rod and apparatus. Liquid Carbonic Corp., The, Chicago, Ill.
Geddes—Radiation. Fowler & Wolfe Radiator Co., Norristown, Pa.
Gehl—Stokers. Eddy Stoker Corp., Chicago, Ill.
Gemaco—Compressors. General Machinery Co., Spokane, Wash.
Gemco—Bolts, clamps, hangers and supports, fasteners. Goodloe E. Moore, Inc., Danville, Ill.
Gemco—Air conditioning units. General Engineering & Mfg. Co., St. Louis, Mo.
Gemware—Hygrometers, psychrometers, thermometers, G. M. Mfg. Co., New York, N. Y.
Genuine Stillson—Wrenches. Walworth Co., New York, N. Y.
Gerotor—Rotary pumps. May Oil Burner Div., Gerotor May Corp., Baltimore, Md.
Giant—Radiation. John J. Nesbitt, Inc., Philadelphia, Pa.
Giant—Radiator hangers. Western Hanger Co., San Francisco, Calif.
Gilbarco—Compressors, oil burners, heaters. Gilbert & Barker Mfg. Co., West Springfield, Mass.
Gilsonite—Protective coatings. Ohmlac Paint & Refining Co., Inc., New York, N. Y.
Gilt Edge—Belting. Rhoads & Sons, J. E., Philadelphia, Pa.
Gland-Pakt—Expansion joints. Yarnall-Waring Co., Philadelphia, Pa.
Globe—Clamps, plates, hangers and supports. Hupp Corp., Globe Stamping Div., Cleveland, O.
Glo-Tech—Glass pipe. Fischer & Porter Co., Hatboro, Pa.
Glowan—Gas burners. Martin Co., Inc., J. O., San Francisco, Calif.
Gloweld—Welded steel tubing. Globe Steel Tubes Co., Milwaukee, Wis.
Glucosates—Compounds, steam system treatment. Haering & Co., Inc., D. W., San Antonio, Tex.
Glycolator—Sterilizing units. Iron City Chemical Co., Evans City, Pa.
Glycolator—Sterilizing units. Pittsburgh Chemical Laboratories, Inc., Pittsburgh, Pa.
Glycosol—Sterilizing units. Pittsburgh Chemical Laboratories, Inc., Pittsburgh, Pa.
Glycosol—Sterilizing units. Iron City Chemical Co., Evans City, Pa.
Gohi—Sheets. Newport Rolling Mill Co., Newport, Ky.
Gold Bond—Insulation. National Gypsum Co., Buffalo, N. Y.
Goodyearite—Packing. Goodyear Tire & Rubber Co., Akron, O.
Gordon—Pipe and tubing benders. Pacific Machine & Iron Wks., Tacoma, Wash.
Grad-U-Motor—Damper operators. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Gradustat—Regulators, thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Gradutrol—Diaphagm valves, radiator orifices. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Grand Rapids—Boiler vacuum cleaners. Doyle Vacuum Cleaner Co., Grand Rapids, Mich.
Granodine—Protective coatings. American Chemical Paint Co., Ambler, Pa.
Granodraw—Protective coatings. American Chemical Paint Co., Ambler, Pa.
Graylite—Insulation. Insulite Co., Minneapolis, Minn.
Greastop—Air filters. Air-Maze Corp., Cleveland, O.
Greenspot—Hose clamps. Scovill Mfg. Co., Brass Goods Div., Waterville, Conn.
Grid—Cooling and heating surface condensers, radiation, unit heaters. Murray Mfg. Co., D. J., Wausau, Wis.
Gripzins—Expansion bolts. Star Expansion Bolt Co., New York, N. Y.
Gritseald—Rotary pumps. St. Louis Tool Co., St. Louis, Mo.
Gruvagrip—Couplings. Gustin Bacon Mfg. Co., Kansas City, Mo.
Guardian—Gaskets. Garlock Packing Co., Palmyra, N. Y.
Gunchrome—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.
Gundol—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.
Gun Pakt—Expansion joints. Yarnall-Waring Co., Philadelphia, Pa.
Guthfan—Fans. Guth Co., Edwin F., St. Louis, Mo.
Gyrol Fluid Drive—Speed changer. American Blower Corp., Detroit, Mich.
Gyroseals—Shaft seals. Cook Electric Co., Chicago, Ill.

H & C—Grilles, registers. Hart & Cooley Mfg. Co., Holland, Mich.
H-O-H—Compounds, feeders, steam system and water treatment. Haering & Co., Inc., D. W., San Antonio, Tex.
HS—Fans. American Blower Corp., Detroit, Mich.
Hammerkraft—Enamels and lacquers. Hilo Varnish Corp., Brooklyn, N. Y.
Hammermill—Belting. Goodyear Tire & Rubber Co., Akron, O.
Hammer-on—Regulators. Air Control Products, Inc., Coopersville, Mich.
Hammer-Set—Bolts. Rawlplug Co., Inc., The, New York, N. Y.
Hancock—Valves. Manning, Maxwell & Moore, Inc., Bridgeport, Conn.
Handy—Benders. Holsclaw Bros., Inc., Evansville, Ind.
Handy—Ducts and duct fittings. Meyer & Bro. Co., F., Peoria, Ill.
Handy Andy—Vise stands. Western Wire Products Co., St. Louis, Mo.
Hardweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Hartmann—Heaters. Montgomery Bros., San Francisco, Calif.
Hazleton—Pumps, strainers, valves. Barrett, Haentjens & Co., Hazleton, Pa.
Heacon—Dampers. Thermix Corp., The, Greenwich, Conn.
Heath-Crete—Refractories. Quigley Co., Inc., New York, N. Y.
Heart-Oak—Belting. Graton & Knight Co., Worcester, Mass.
Heat-aid—Refractories. Pyrolite Products Co., Cleveland, O.
Heat Extractor—Boilers. National Radiator Co., The, Johnstown, Pa.
Heatomat—Boilers. Richmond Radiator Co., New York, N. Y.
Heat-O-Meter—Temperature regulators, thermostats. Miller-Harris Instrument Co., Milwaukee, Wis.
Heat-Pak—Boilers, heaters. Aldrich Co., The, Wyoming, Ill.
Heat-Rite—Registers. Auer Register Co., Cleveland, O.
Heatsum—Conductors. Roberson Co., L. N., Seattle, Wash.
Heat-Tite—Insulating cement. Ramtite Co., The, Chicago, Ill.
Heat-Valve—Ventilators. Swartwout Co., Cleveland, O.
Heat-X—Heat exchangers, aftercoolers, chillers, coolers, heaters, condensers. Heat-X-Changer Co., Inc., The, New York, N. Y.
Heat-X-Fin—Finned surface and tubing. Heat-X-Changer Co., Inc., The, New York, N. Y.
Heet-Master—Process and storage tanks. Aeroil Products Co., Inc., South Hackensack, N. J.
Heliarc—Welders. Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Helical—Tubing. Rome-Turney Radiator Co., Rome, N. Y.
Heliflow—Aftercoolers, chillers, oil coolers, heat exchangers, water heaters. Graham Mfg. Co., Inc., New York, N. Y.
Hellite—Refractories. Johns-Manville, New York, N. Y.
Herco—Arc welders. Hercules Electric & Mfg. Co., Inc., Brooklyn, N. Y.
Herculoy—Tubing. Revere Copper and Brass, Inc., New York, N. Y.
Herecrol—Protective Coatings. Heresite & Chemical Co., Manitowoc, Wis.
Hev-E-Oil—Burners. Cleaver-Brooks Co., Milwaukee, Wis.
Hi-Cap—Furnaces. Syncromatic Corp., Watertown, Wis.
Hi-Duty—Tubing cutters, flaring tools, Imperial Brass Mfg. Co., Chicago, Ill.
Hi-Duty—Combustion chambers. Monogram Products Co., Inc., Philadelphia, Pa.
Hi-Fin—Surfaces, tubing. Doyle & Roth Mfg. Co., Brooklyn, N. Y.
Highflex—Belting. Goodrich Co., B. F., Akron, O.
High - Ten - 500—Solder. Industrial Service Laboratories, Milwaukee, Wis.
High Test—Water heaters. Burnam Corp., Boiler Div., Irvington, N. Y.
Hi-Gloss—Steel sheets. Jessop Steel Co., Washington, Pa.
Hilger—Chillers, refrigerating compressors, unit coolers, unit air conditioners, valves. XL Refrigerating Co., Inc., Chicago, Ill.
Hi-Lift—Pumps. Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Hi-Lo—Alarms. Yarnall-Waring Co., Philadelphia, Pa.
Hi-Lo—Pumps. Yeomans Bros. Co., Chicago, Ill.
Hi-Lo-Graph—Recorders. Yarnall-Waring Co., Philadelphia, Pa.
Hi-Peak—Water chillers. Acme Industries, Inc., Jackson, Mich.
Hirae—Electric heating conductors. Crittall Radiant Heating, Inc., Richard, New York, N. Y.
Hi-Seal—Cement and compounds. Greene, Tweed & Co., North Wales, Pa.
Hi-Speed—Welding and cutting apparatus. Dockson Corp., Detroit, Mich.
Hi-Spra—Spray nozzles. Thermal Industries, Indio, Calif.
Hitchings—Boilers. Burnham Corp., Boiler Div., Irvington, N. Y.
Hi - Temp—Insulation. Carey Mfg. Co., Philip, Lockland, Cincinnati, O.
Hi-Test—Boilers. Kewanee Boiler Co., Kewanee, Ill.
Hi-Value—Adhesive tape. Johns-Manville, New York, N. Y.
Hoffman—Water heaters. Clayton & Lambert Mfg. Co., Louisville, Ky.
Hoffman—Draft controls. Salina Metal Products Co., Salina, Kan.
Holdtite—Solder. American Brass Co., Waterbury, Conn.
Holgun—Drills. Black & Decker Mfg. Co., Towson, Md.
Holgun—Drills. Van Dorn Electric Tool

Co., Towson, Md.
Holiday—Air conditioning units. Comfort Products Corp., Dallas, Tex.
Hollo-Tech—Doors and panels. Technical Ply-Woods, Chicago, Ill.
Holt—Strainers, tube cleaners. Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Holtite—Clamps. Yarnall-Waring Co., Philadelphia, Pa.
Honeycomb—Filters. Wilson & Co., Inc., Chicago, Ill.
Horton—Tanks. Chicago Bridge & Iron Co., Chicago, Ill.
Hot Boy—Unit heaters. Coroaire Heater Corp., The, Cleveland, O.
Hot Shot—Pumps. Yeomans Bros. Co., Chicago, Ill.
Hot Spot—Preheaters. Rempe Co., Chicago, Ill.
Hot Spot—Spot welders. Acme Electric Welder Co., Los Angeles, Calif.
Houghto-Clean—Boiler cleaning compounds. Houghton & Co., E. F., Philadelphia, Pa.
Hovalco—Valves. Homestead Valve Mfg. Co., Coraopolis, Pa.
Huber—Stokers. Flynn & Emrich Co., Baltimore, Md.
Humiclean—Cleaning compounds, water treatment. Carolina Aniline & Extract Co., Charlotte, N. C.
Humidair—Humidifiers. Skilbeck Mfg. Co., Kenosha, Wis.
Humidigraph—Humidity recorders. Bristol Co., Waterbury, Conn.
Humidiguide—Hygrometers. Taylor Instrument Companies, Rochester, N. Y.
Humidostat—Humidistats. Johnson Service Co., Milwaukee, Wis.
Humiduct—Unit air conditioners. Bahnson Co., Winston-Salem, N. C.
Humid - U - Stat—Humidistats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Humi-Temps—Unit air coolers. Larkin Coils, Atlanta, Ga.
Hum-O-Zone—Room type humidifiers. Daffin Mfg. Co., Lancaster, Pa.
Humphrey—Heaters. General Gas Light Co., Kalamazoo, Mich.
Hurricane—Heaters. Zink Co., John, Tulsa, Okla.
Hydralt—Protective coatings. Flintkote Co., The, New York, N. Y.
Hydramotor—Valves. General Controls Co., Glendale, Calif.
Hydro—Recorders. Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Hydro-Clone--Dust collectors, welding fume exhausters. Whiting Corp., Harvey, Ill.
Hydro-Flo—Heaters, heating systems, circulators, regulators. Bell & Gossett Co., Morton Grove, Ill.
Hydro-Foam—Dust collectors. Mahon Co., R. C., Detroit, Mich.
Hydro-Foil—Pumps. Peerless Pump Div., Food Machinery & Chemical Corp., Los Angeles, Calif.
Hydroline—Shaft seals. Peerless Pump Div., Food Machinery and Chemical Corp., Los Angeles, Calif.
Hydro-Matic—Connectors. Mechanical Products Corp., Chicago, Ill.
Hydron—Bellows. Clifford Mfg. Co., Div. of Standard-Thomson Corp., Waltham, Mass.
Hydro-Sheave—Hydraulic coupling changers. Twin Disc Clutch Co., Rockford, Ill.
Hydro Therm—Heaters, heating systems. Hook & Ackerman, Inc., New York, N. Y.
Hydro-Whirl—Dust collectors, spray booths. Peters-Dalton, Inc., Detroit, Mich.
Hydryer—Dehumidifiers. Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Hy-Duty—Blower wheels, fans. Schwitzer-Cummins Co., Indianapolis, Ind.
Hynes—Heaters. Martin-Quaid Co., Philadelphia, Pa.
Hy-Power—Shears and snips. Wiss & Sons Co., J., Newark, N. J.
Hyrate—Refractories. Plibrico Jointless Firebrick Co., Chicago, Ill.
Hy-Speed—Pipe vises. Munton Mfg. Co., Franklin Park, Ill.
Hytemp—Insulation. Armstrong Cork Co., Lancaster, Pa.
Hy-Temp—Cement, insulation. Keasbey & Mattison Co., Ambler, Pa.
Hytempite—Cement, refractories. Quigley Co., Inc., New York, N. Y.
Hy-Test—Water heaters, Smith Co., Inc., H. B., The, Westfield, Mass.

IMO—Pumps. De Laval Steam Turbine Co., Trenton, N. J.
I-R—Ingersoll-Rand, New York, N. Y.
IVCO—Ventilators. Iona Ventilator Co., Inc., Philadelphia, Pa.
Ice-Cel—Refrigeration accumulators. Dole Refrigerating Co., Chicago, Ill.
Icy-Flo—Accumulators. McQuay, Inc., Minneapolis, Minn.
Ideal—Blowers. Perfection Grate & Stoker Co., Springfield, Mass.
Ideal—Speed changers, pulleys and sheaves. Lovejoy Flexible Coupling Co., Chicago, Ill.
Ideal—Traps. Nason Co., Detroit, Mich.
Immersatherm—Thermostats. Mercoid Corp., The, Chicago, Ill.
Impact—Nozzles. Phillips Cooling Tower Co., Inc., Brooklyn, N. Y.
Imperial—Air conditioning units. International Metal Products Co., Phoenix, Ariz.
Impulse—Traps. Yarnall-Waring Co., Philadelphia, Pa.
Inco—Electrodes, nipples, flanges, pipe fittings, pipe, rod, sheets, tubing. International Nickel Co., Inc., The, New York, N. Y.
Inconel—Pipe, fittings, nipples, flanges, pipe, sheets, tubing. International Nickel Co., Inc., The, New York, N. Y.
Inconel—Tubing. Trent Tube Co., East Troy, Wis.
Indeeco—Heaters, pipe heating systems. Industrial Engineering & Equipment Co., St. Louis, Mo.
Indoor-Outdoor—Thermostats. White-Rodgers Electric Co., St. Louis, Mo.
IngAclad—Stainless clad sheets. Ingersoll Steel Div., Borg-Warner Corp., Chicago, Ill.
In-Hib-Co—Protective coatings. Haering & Co., Inc., D. W., San Antonio, Tex.
Inkstop—Air filters. Air-Maze Corp., Cleveland, O.
Ins-lite—Insulation. Insulite Co., Minneapolis, Minn.
Instant—Heaters, preheaters. Johnson Corp., The, Three Rivers, Mich.
Insulag—Insulation. Quigley Co., Inc., New York, N. Y.
Insulbrix—Refractories. Quigley Co., Inc., New York, N. Y.
Insulcrete—Insulating cement, refractories. Quigley Co., Inc., New York, N. Y.
Insulfil—Insulation. Refractory & Insulation Corp., New York, N. Y.
Insulwool—Insulation. General Insulating Products Co., Brooklyn, N. Y.
Insutape—Pipe insulation. Union Asbestos & Rubber Co., Cicero, Ill.
Insutube—Insulation. Union Asbestos & Rubber Co., Cicero, Ill.
Integral Jet—Burners. Stout & Sons, David, St. Louis, Mo.
Intensarc—Electrodes. National Carbon Co., New York, N. Y.
Inter-Matic—Time switches. International Register Co., Chicago, Ill.
International—Liquid level gages. Applied Mechanics Co., Boston, Mass.
Involute—Spray nozzles. Yarnall-Waring Co., Philadelphia, Pa.
Ionaire—Ionization apparatus. General Ozone Corp., Chicago, Ill.
Ironset—Furnace cement. Fireline Stove & Furnace Lining Co., Chicago, Ill.
Ironweld—Compounds. Sight Feed Generator Co., West Alexandria, O.
Irv-o-lite—Plastic tubing. Irvington Varnish and Insulator Co., Irvington, N. J.
Isomodes—Bases and pads, vibration isolating. M. B. Mfg. Co., The, New Haven, Conn.

J & C—Burners, fans, furnaces, heaters. Jackson & Church Co., Saginaw, Mich.
J F S—Speed changers. Stephens-Adamson Mfg. Co., Aurora, Ill.
J-M—Gaskets, bases and pads, cement, tape. Johns-Manville, New York, N. Y.
J-M Ball—Floats, traps. Cryer Trap & Valve Co., Inc., New York, N. Y.
J O Line—Wrenches, valves. J O Mfg. Co., South Gate, Calif.
Jacobus—Valves. Majot Automatic Machine Co., Inc., East Orange, N. J.
Janitrol—Boilers, burners, heaters, systems, unit air conditioners. Surface Combustion Corp., Toledo, O.
Jarco—Unions, valves. Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Ject-O-Valve—Ventilators. Swartwout Co., Cleveland, O.
Jennings—Pumps, ejectors. Nash Engineering Co., South Norwalk, Conn.
Jetal—Protective coatings. Alrose Chemical Co., Providence, R. I.
Jetcote—Protective coatings. Watson-Standard Co., Pittsburgh, Pa.
Jiffy Clips—Hangers and supports. Minerallac Electric Co., Chicago, Ill.
Jiffy—Regulators. Parker-Kalon Corp., New York, N. Y.
Joaz—Stainless steel fittings. J O Mfg. Co., South Gate, Calif.
John Crane—Boiler tube expanders, seals, packing. Crane Packing Co., Chicago, Ill.
Jointite—Insulation. Mundet Cork Corp., North Bergen, N. J.
Jorgensen—Pipe clamps. Adjustable Clamp Co., Chicago, Ill.
Junior—Radiation. Weil-McLain Co., Michigan City, Ind.
JusRite—Ducts and duct fittings. Corbman Bros., Inc., Philadelphia, Pa.

K—Fittings. Kuhns Brothers Co., Dayton, O.
K. A. T.—Compounds and water treatment. American K.A.T. Corp., Garwood, N. J.
K-B—Dampers, regulators. Kerentoff, G. L., Cincinnati, O.
K-C—Motors. Hoover Co., Kingston-Conley Div., North Plainfield, N. J.
K-Fin—Cooling and heating surface. Griscom-Russell Co., The, New York, N. Y.
K and M—Controls, strainers, traps, valves. Kieley & Mueller, Inc., North Bergen, N. J.
K-Master—Filters, traps, valves. Kaye & MacDonald, Inc., West Orange, N. J.
K-Shield—Boiler and pipe insulation. Robinson Industries, Coleman, Mich.
K-S-V—Ventilators. Kernchen Co., Chicago, Ill.
Kable Kord—Belting. Gilmer Co., L. H., Div. of United States Rubber Co., Philadelphia, Pa.
Kane—Boilers. Mears - Kane - Ofeldt, Inc., Bridgeport, Pa.
Karbate—Carbon pipe, heat exchangers, pumps. National Carbon Co., New York, N. Y.
Kasson—Motors. General Die and Stamping Co., New York, N. Y.
Kathabar—Dehumidifiers, humidifiers, unit air conditioners. Surface Combustion Corp., Toledo, O.
Kek—Compounds, steam and water treatments. Kenite Laboratory, Inc., Madison, N. J.
Keldur—Bases and pads. Hobsite Products Co., Paterson, N. J.
Kemtex—Water softener. MacDermid Chemical Co., Bristol, Conn.
Ken—Combustion chambers. Barclay, Inc., Robert, Chicago, Ill.
Kenbric—Soot destroyers. Kenite Laboratory, Inc., Madison, N. J.
Kentucky—Sheets. Newport Rolling Mill Co., Newport, Ky.
Keystone—Gas fired heaters. Bastian-Morley Co., Inc., LaPorte, Ind.
Key-Tite—Cement and compounds. Key Co., East St. Louis, Ill.
Kidskin—Packing. Darcoid Co., Inc., New York, N. Y.
Kil-Mos—Water treatment. Chemical Engineering Co., Dallas, Tex.
Kimsul—Insulation. Kimberly-Clark Corp., Neenah, Wis.
King-clip—Valves. Lunkenheimer Co., Cincinnati, O.
King Leak-Pruf—Gages. Oil Equipment Mfg. Corp., New Haven, Conn.
Kleen Air—Air filters. Kaye & MacDonald, Inc., West Orange, N. J.
Kleenflo—Unit air filters. Air-Maze Corp., Cleveland, O.
Kleen Tube—Heaters. Vapor Heating Corp., Chicago, Ill.
Klingtite—Belting. Goodyear Tire & Rubber Co., Akron, O.
Klixon—Temperature control valves, motor controllers. Spencer Thermostat Div., Metals & Controls Corp., Attleboro, Mass.
Klondike—Arc welders. Fern, Ralph, Scranton, Pa.
Klosd—Motors. Sterling Electric Motors, Inc., Los Angeles, Calif.
Knight-Ware—Pipe, prefabricated ducts, valves, ventilators. Knight, Maurice A., Akron, O.
Knock-Out—Arc welders, torches, drills. Lee Co., K. O., Aberdeen, S. D.
Kno-Draft—Air diffusers. Connor Engineering Corp., W. B., Danbury, Conn.
Kold Board—Insulation. Baldwin-Hill Co., Trenton, N. J.
Kontrol Master—Air valves. Kieley & Mueller, Inc., North Bergen, N. J.
Kontrol Motor—Diaphragm valves. Kieley & Mueller, Inc., North Bergen, N. J.
Kooler-Aire—Commercial air conditioners. United States Air Conditioning Corp., Minneapolis, Minn.
Kool Master—Propeller fans. Air Equipment Co., Chicago, Ill.
Kool-Shade—Solar heat resisting screens. Ingersoll Products Div., Borg-Warner Corp., Chicago, Ill.
Korector—Draft controls. Cole-Sewell Engineering Co., St. Paul, Minn.
Korolac—Protective coatings. Goodrich Co., B. F., Akron, O.
Koroseal—Plastic tubing, protective coatings. Goodrich Co., B. F., Akron, O.
Koven—Heaters. Waterfilm Boilers, Inc., Jersey City, N. J.
Kromatrol—Colorimeters. Will Corp., Rochester, N. Y.
Krome Kote—Coatings. Wolfe-Kote Co., Inc., Sheboygan, Wis.
Kwikflux-Solder. Special Chemicals Corp., New York, N. Y.
Kwik-way—Regulators. Hart & Cooley Mfg. Co., Holland, Mich.
Kyram—Refractories and refractory cement. Quigley Co., Inc., New York, N. Y.

L. A.—Motors. The Louis Allis Co., Milwaukee, Wis.
L-R—Couplings. Lovejoy Flexible Couplings Co., Chicago, Ill.
L.R.D.—Valves. Grinnell Co., Inc., Providence, R. I.
Lamneck—Ducts and duct fittings. Clayton & Lambert Mfg. Co., Louisville, Ky.
Lawson—Wrenches. USHCO Mfg. Co., Inc., Buffalo, N. Y.
L-Blow—Fans, ventilators. Trade-Wind Motor-

fans, Inc., Los Angeles, Calif.

Leader—Stocks and dies. Oster Mfg. Co., Cleveland, O.

Leaflex—Enamels and lacquers. Interchemical Corp., Finishes Div., Newark, N. J.

Leak Lock—Cement and compounds. Highside Chemicals Co., Clifton, N. J.

Lectro-Clad—Protective coatings. Bart Mfg. Co., Inc., Belleville, N. J.

Lectrodryer—Dehumidifiers. Pittsburgh Lectrodryer Corp., Pittsburgh, Pa.

Ledaloyl—Sleeve bearings. Johnson Bronze Co., New Castle, Pa.

Leeds—Switches. Walton Co., Hartford, Conn.

Leigh—Roof ventilators. Air Control Products, Inc., Coopersville, Mich.

Lektro-Kleen—Air cleaners. Lennox Furnace Co., Marshalltown, Ia., Syracuse, N. Y. & Columbus, O.

Letheray—Sterilizing lamps. Hanovia Chemical & Mfg. Co., Newark, N. J.

Levalarm—Alarm. Reliance Gauge Column Co., Cleveland, O.

Levelimeter—Indicators, alarms, gages, recorders, regulators, switches. Fischer & Porter Co., Hatboro, Pa.

Levelizer—Gas regulators. Mueller Furnace Co., L. J., Milwaukee, Wis.

Levelometer—Gages, recorders. Liquidometer Corp., Long Island City, N. Y.

Lever-Seald—Valves. Homestead Valve Mfg. Co., Coraopolis, Pa.

Level-Temp—Thermostats. White-Rodgers Electric Co., St. Louis, Mo.

Level-Trol—Regulators. Fisher Governor Co., Marshalltown, Ia.

Liberty—Packing. Johns-Manville, New York, N. Y.

Liberty—Ventilators, caps. Penn Ventilating Co., Philadelphia, Pa.

Life Line—Electric motors. Westinghouse Electric Corp., Pittsburgh, Pa.

Light Duty—Pulleys. Gates Rubber Co., The, Denver, Colo.

Lightening Hole—Punches. M-M-A, Inc., Lancaster, Pa.

Lightning—Cleaning compounds. Western Chemical Co., Kansas City, Mo.

Lightweld—Electrodes. Lincoln Electric Co., The, Cleveland, O.

Lima—Stokers. Carnes, Inc., John R., Lima, O.

Limit-Load—Centrifugal fans. Buffalo Forge Co., Buffalo, N. Y.

Limitorque—Valves. Philadelphia Gear Works, Inc., Philadelphia, Pa.

Limpet—Insulation. Keasbey & Mattison Co., Ambler, Pa.

Lincwelder—Welders. Lincoln Electric Co., The, Cleveland, O.

Line—Electric motors, speed reducers. Brown-Brockmeyer Co., Inc., Dayton, O.

Lineflow—Fans. American Blower Corp., Detroit, Mich.

Line-o-flo—Air diffusers, grilles. Barber-Colman Co., Rockford, Ill.

Link-Grip—Pipe wrenches. American Machine Wks., Inc., Racine, Wis.

Lin-X—Enamels and lacquers. Acme White Lead & Color Works, Detroit, Mich.

Lincolnwelder—Arc welders. Lincoln Electric Co., The, Cleveland, O.

Lipco—Cement lined fittings and pipe. Cement Lined Pipe Co., Lynn, Mass.

Lipman—Unit coolers, air conditioners, condensers, compressors, cooling surface. General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.

Liquidepth—Indicators. Petrometer Corp., Long Island City, N. Y.

Liquiflux—Welding compounds. Sight Feed Generator Co., West Alexandria, O.

Liqui-Jector—Dehumidifiers, dehydrants, dehydrators. Selas Corp. of America, Philadelphia, Pa.

Liquon—Filters, water softeners, water treatment. Liquid Conditioning Corp., Philadelphia, Pa.

Lite-Cast—Combustion chambers. Monogram Products Co., Inc., Philadelphia, Pa.

Lithcote—Coatings. Lithgow Corp., Chicago, Ill.

Lithoform—Protective coatings. American Chemical Paint Co., Ambler, Pa.

Little Blacksmith—Punches, shears. Kidder Mfg. Co., Inc., J. F., Burlington, Vt.

Little Giant—Sump pumps. Chicago Pump Co., Chicago, Ill.

Little Giant—Stock and dies. Greenfield Tap & Die Corp., Greenfield, Mass.

Little Giant—Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.

Livermont—Wrenches. Richmont, Inc., Los Angeles, Calif.

Lloyd—Solder and fluxes. Johnson Mfg. Co., Inc., Mt. Vernon, Ia.

Lo-Blast—Burners. Mid-Continent Metal Products Co., Chicago, Ill.

Lo-Fin—Surfaces, tubing. Doyle & Roth Mfg. Co., Brooklyn, N. Y.

Lockaire—Insulation. Plastergon Wall Board Co., Buffalo, N. Y.

Lockseam—Pipe. Naylor Pipe Co., Chicago, Ill.

Locktite—Regulators, dampers. Ohio Products Co., Cleveland, O.

Lodi—Boilers. Super Mold Corp., Lodi, Calif.

Lok-Joint—Insulation. Insulite Co., Minneapolis, Minn.

Lolag—Heaters. American Instrument Co., Silver Spring, Md.

Longrip—Pipe extractors. Ridge Tool Co., Elyria, O.

Lookout Heggie-Simplex—Boilers, heaters. Lookout Boiler & Mfg. Co., Chattanooga, Tenn.

Lord Burnham—Boilers. Burnham Corp., Boiler Div., Irvington, N. Y.

Lo-Set—Stokers. Canton Stoker Corp., Canton, O.

Louvre—Louvers and shutters. Kelvin-White Co., Boston, Mass.

Lowcost—Boilers. Murray Iron Works Co., Burlington, Ia.

Lown—Machines. San Angelo Foundry & Machine Co., San Angelo, Tex.

Loxin—Bolts. Star Expansion Bolt Co., New York, N. Y.

Loxite—Pipe covering adhesives. Firestone Industrial Products Co., Akron, O.

Luminite—Boiler cleaning compounds, steam system treatment. Warren Refining & Chemical Co., The, Cleveland, O.

Lyonore Metal—Sheets. Lyon, Conklin & Co., Inc., Baltimore, Md.

M. E.—Fans. New York Blower Co., Chicago, Ill.

M. E.—Motors. Marathon Electric Mfg. Corp., Wausau, Wis.

M. & E.—Cooling surface, tubing, unit coolers, unit heaters. Merchant & Evans Co., Philadelphia, Pa.

M & F—Rubber base enamel. American-Marietta Co., Chicago, Ill.

M & H—Sheets. Matthiessen & Hegeler Zinc Co., La Salle, Ill.

MIF—Couplings, fittings. Malleable Iron Fittings Co., Branford, Conn.

MKO—Pumps. Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.

M & M—Alarms, cut-offs, feeders, humidifiers, indicators, operators, pumps, regulators, switches, valves. McDonnell & Miller, Inc., Chicago, Ill.

M-R-C—Ball bearings. Marlin-Rockwell Corp., Jamestown, N. Y.

M-Scope—Pipe locators, leak detectors. Fisher Research Laboratory, Inc., Palo Alto, Calif.

M & T—Welders. Metal & Thermit Corp., New York, N. Y.

M/W and A/C Airmat—Air filters. American Air Filter Co., Inc., Louisville, Ky.

M-VB—Valves. Scovill Mfg. Co., Brass Goods Div., Waterville, Conn.

Macheta—Fans, fan blades, ventilators. Aerovent Fan Co., Inc., Piqua, O.

Mack—Radiator air valves. Marks Bros. Co., Boston, Mass.

Magic—Cement and compounds. Blue Ridge Talc Co., Inc., Henry, Va.

Magic-Aire—Unit heaters, fans, air conditioning units. United Electric Service Co., Wichita Falls, Tex.

Magic Dial—Pre-assembled control systems. Midwest Automatic Control Co., Des Moines, Ia.

Magic Eye Door—Door controls. Stanley Works, The, New Britain, Conn.

Magic-Grip—Sheaves. Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Magic Wire—Control systems wire. Midwest Automatic Control Co., Des Moines, Ia.

Magnefer—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.

Magnehelic—Portable analyzers. Dwyer Mfg. Co., F. W., Chicago, Ill.

Magnetrol—Alarms, boiler cut-offs, switches. Schaub Engineering Co., Fred H., Chicago, Ill.

Magnilastic—Pipe joints. Cook Electric Co., Chicago, Ill.

Mainliner—Fan blades. Burden Co., Alan E., Hollywood, Calif.

Make-up Air—Air conditioning units. New York Blower Co., Chicago, Ill.

Manganend—Electrodes. Arcos Corp., Philadelphia, Pa.

Manganweld—Electrodes. Lincoln Electric Co., Cleveland, O.

Manotox—Coatings. X-Pando Corp., Long Island City, N. Y.

Manu-Rod—Pipe cleaning machines. Spartan Tool Co., Chicago, Ill.

Mark Time—Time switches. Rhodes, Inc., M. H., Hartford, Conn.

Marocol—Compounds. O'Brien Industries, Jersey City, N. J.

Marvair—Air conditioning units. Muncie Gear Works, Muncie, Ind.

Marvellaire—Air conditioning units. Meyer Furnace Co., The, Peoria, Ill.

Marvelous—Gas fired heaters. Bastian-Morley Co., Inc., LaPorte, Ind.

Marvelwite—Enamels and lacquers. Sonneborn Sons, Inc., L., New York, N. Y.

Masco—Combustion chambers. Munn & Steele, Inc., South Boston, Mass.

Mascote—Insulation. Munn & Steele, Inc., South Boston, Mass.

Massachusetts—Fans, unit heaters, blower wheels, air washers, housings. Bishop & Babcock Mfg. Co., Cleveland, O.

Master—Heating systems, valves. Radiator Valve Co. of America, Philadelphia, Pa.

Master—Fittings. Mel Products Co., The, New Haven, Conn.

Master—Stokers. Muncie Gear Wks., Inc., Muncie, Ind.

Master—Speed changers, controls, thermostats, regulators, switches. White Mfg. Co., St. Paul, Minn.

Master—Unions. Jefferson Union Co., Inc., New York, N. Y.

Master—Water heaters. Kehm Corp., The, Chicago, Ill.

Master-Bilt—Pumps. Schaub Engineering Co., Fred H., Chicago, Ill.

Master Kraft—Oil burners. Harvey-Whipple, Inc., Springfield, Mass.

Maximon—Gages. J. E. Lonergan Co., Philadelphia, Pa.

Maxsteam—Boilers. Martin Co., Inc., J. O., San Francisco, Calif.

McDaniel—Floats, traps. Watson & McDaniel Co., Philadelphia, Pa.

McKay O—Boilers. Mears-Kane-Ofeldt, Inc., Bridgeport, Pa.

McKee—Boilers, blowers, heaters, blast gates, systems, burners, feeders, pumps, regulators, tanks, torches, valves. Eclipse Fuel Engineering Co., Rockford, Ill.

McKeesport—Radiation. Columbia Radiator Co., McKeesport, Pa.

McKnight—Registers. Tuttle & Bailey, Inc., New Britain, Conn.

Measurrench—Wrenches. Williams & Co., J. H., Buffalo, N. Y.

Meco—Torches, compounds, gages, regulators, valves, welding rod. Modern Engineering Co., St. Louis, Mo.

Medrae—Electric heating conductors. Crittall Radiant Heating, Inc., Richard, New York, N. Y.

Melloblu—Gas burners. Beck Engineering Combustion Kompany, St. Louis, Mo.

Mel-Rock—Humidifiers, units, ventilators, washers. Mellish & Murray Co., Chicago, Ill.

Merrill Process—Heating systems. Parks-Cramer Co., Fitchburg, Mass.

Metal-Master—Shears. Wiss & Sons Co., J., Newark, N. J.

Metalflo—Tubes and tubing. H & H Tube & Mfg. Co., Detroit, Mich.

Metalhide—Protective coatings. Pittsburgh Plate Glass Co., Pittsburgh, Pa.

Metalite—Enamels and lacquers. Atlas Powder Co., North Chicago, Ill.

Metalprep—Compounds. Nielson Chemical Co., Detroit, Mich.

Metaphram—Valves. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Metco—Ducts and duct fittings. Sheet Metal Mfg. Co., Inc., Brooklyn, N. Y.

Metermax—Thermometers. Leeds & Northrup Co., Philadelphia, Pa.

Met-L-Flex—Bases and pads. Robinson Aviation, Inc., Vibrashock Div., Teterboro, N. J.

Metl-Tech—Doors and panels, metal sheets. Technical Ply-Woods, Chicago, Ill.

Metric—Meters. American Meter Co., Inc., New York, N. Y.

Metrotherm—Thermostats. General Controls Co., Glendale, Calif.

Micafil—Insulation. Munn and Steele, Inc., South Boston, Mass.

Mico—Insulation. Mineral Insulation Co., Chicago Ridge, Ill.

Micro—Low water cut-offs. Maid-O'-Mist, Inc., Chicago, Ill.

Micro-Feed—Humidifiers. Cleveland Humidifier Co., Cleveland, O.

Micr-O-Feeder—Proportioning pumps. % Proportioneers, Inc. %, Providence, R. I.

Micro-Klean—Filters. Cuno Engineering Corp., Meriden, Conn.

Micromax—Recorders, indicator and recorder-controllers, thermometers. Leeds & Northrup Co., Philadelphia, Pa.

Micromet—Water treatment. Calgon Inc., Pittsburgh, Pa.

Micromotors—Motors. Redmond Co., Inc., Owosso, Mich.

Micro-Netic—Feeders. Campbell Co., J. A., Long Beach, Calif.

MicroRold—Sheets. Washington Steel Corp., Washington, Pa.

Microtherm—Thermostats. Barber-Colman Co., Rockford, Ill.

Microvac—Pumps. Stokes Machine Co., F. J., Philadelphia, Pa.

Micro-Weld—Spot welders. Micro Products Co., Chicago, Ill.

Midget—Radiation. Utica Radiator Corp., Utica, N. Y.

Midget Powerhouse—Unit heaters. Century Engineering Corp., Cedar Rapids, Ia.

Mighty Mite—Thermostats. Mechanical Industries Production Co., Akron, O.

Milcor—Doors and panels. Inland Steel Products Co., Milwaukee, Wis.

Milford—Tools. Thompson & Son Co., The Henry G., New Haven, Conn.

Mills—Boilers. Smith Co., Inc., H. B., The, Westfield, Mass.

Milvaco—Air eliminators, floats, strainers, traps, valves, Milwaukee Valve Co., Milwau-

kee, Wis.
Minneapolis—Compressors. North Penn Co., New York, N. Y.
Mipco—Valves. Marine & Industrial Products Co., Philadelphia, Pa.
Miracle Red—Coatings. Debevoise Co., The, Brooklyn, N. Y.
Miracula—Air conditioning units. General Engineering & Mfg. Co., St. Louis, Mo.
Mir-O-Meter—Combustion control systems. Bowser, Inc., Fort Wayne, Ind.
Mixend—Arc welding electrodes. Arcos Corp., Philadelphia, Pa.
MKayO—Boilers. Mears-Kane-Ofeldt Inc., Philadelphia, Pa.
Moderator—Heating System. Warren Webster Co., Camden, N. J.
ModernAire—Fans, unit air conditioners. National Gas Equipment Co., Inc., Terrell, Tex.
Moduflow—Control systems. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Modustat—Valves. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Modutrol—Heating systems, valve and duct operators. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Modutron—Regulators. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Mogul—Packing. Johns-Manville, New York, N. Y.
Mogul—Boiler cleaning compounds and water treatment. North American Fibre Products Co., The, Cleveland, O.
Moncrief—Ducts and duct fittings. Henry Furnace Co., The, Medina, O.
Monel—Pipe fittings, nipples, flanges, pipe, sheets, tubing. International Nickel Co., Inc., The, New York, N. Y.
Monend—Arc welding electrodes. Arcos Corp., Philadelphia, Pa.
Mongol—Pipe joint cement and compounds. Baer Bros., New York, N. Y.
Monmouth—Filters, humidifiers, valves. Cleveland Humidifier Co., Cleveland, O.
Mono-Block—Insulation. Baldwin-Hill Co., Trenton, N. J.
Monobolt—Chillers, oil coolers, water heaters. Graham Mfg. Co., Inc., New York, N. Y.
Mono-Cast—Pipe. American Cast Iron Pipe Co., Birmingham, Ala.
Monocast—Refractories and refractory cement. Ramtite Co., The, Chicago, Ill.
Monoflo—Hot water heating systems and fittings. Bell & Gossett Co., Morton Grove, Ill.
Mono-Line—Refractories. Quigley Co., Inc., New York, N. Y.
Monoloct—Heat exchangers. Graham Mfg. Co., Inc., New York, N. Y.
Monomotors—Motors. Redmond Co., Inc., Owosso, Mich.
Mono-Peen—Enamels and lacquers. Interchemical Corp., Finishes Div., Newark, N. J.
Monovent—Ventilators. Burt Mfg. Co., Akron, O.
Monsoon—Fans, grilles, louvers. Jamieson Mfg. Co., Dallas, Texas.
Morflex—Flexible couplings. Morse Chain Co., Detroit, Mich.
Morpholine—Steam system treatment. Carbide & Carbon Chemicals Div., Union Carbide and Carbon Corp., New York, N. Y.
Mortairset—Refractories. Walsh Refractories Corp., St. Louis, Mo.
Mortite—Gaskets. Mortell Co., J. W., Kankakee, Ill.
Moto-Merco—Relays. Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Motopump—Pumps. Yeomans Bros. Co., Chicago, Ill.
MotoReducer—Speed reducers. Philadelphia Gear Works, Inc., Philadelphia, Pa.
Motorstoker—Stokers. Hershey Machine & Foundry Co., Motorstoker Div., Manheim, Pa.
Motosteel—Valves. Taylor Instrument Companies, Rochester, N. Y.
Mototurb—Ventilators. Uno Ventilator Co., Cliftondale, Mass.
Mountain Air—Air conditioning units. Central States Mfg. Co., Inc., Arkansas City, Kan.
Muckle-Vent—Ventilators. Muckle Mfg. Co., Owatonna, Minn.
Muffletone—Insulation. Celotex Corp., The, Chicago, Ill.
Mullitex—Refractories. Walsh Refractories Corp., St. Louis, Mo.
Mult-Au-Matic—Threading and boring machines. Bullard Co., The, Bridgeport, Conn.
Multiblade—Welding fume exhausters. General Blower Co., Morton Grove, Ill.
Multiclone—Dust collectors. Western Precipitation Corp., Los Angeles, Calif.
Multi-Duty—Air filters. American Air Filter Co., Inc., Louisville, Ky.
Multiduty—Pulleys and sheaves. Gates Rubber Co., The, Denver, Colo.
Multilarm—Alarms. Automatic Control Co., St. Paul, Minn.
Multiplane—Vibration isolating bases. Lord Mfg. Co., Erie, Pa.
Multi-Seal—Bolts, repair plugs. Kenney Co., L. C., Chicago, Ill.
Multitherm—Air conditioning units. Clarage Fan Co., Kalamazoo, Mich.
Multi-V—V-belts. Goodrich Co., B. F., Akron, O.
Multivane—Fans, blowers, unit heaters. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Multi-V-Drive—Drives. Worthington Pump & Machinery Corp., Harrison, N. J.
Multi-Wash—Dust collectors. Schneible Co., Claude B., Detroit, Mich.
Murco—Aftercoolers, heat exchangers, unit heaters. Murray Mfg. Co., D. J., Wausau, Wis.
Murex—Welding electrodes. Metal & Thermit Corp., New York, N. Y.

NCG—Solder, torches, welding rod. National Cylinder Gas Co., Chicago, Ill.
N-M-D—Valves. Lunkenheimer Co., Cincinnati, O.
NYB Steelfin—Heating surface. New York Blower Co., Chicago, Ill.
Nalco—Feeders, water treatment, soot destroyers. National Aluminate Corp., Chicago, Ill.
National—Boilers, heaters. National Radiator Co., The, Johnstown, Pa.
National—Fans, furnaces. MaGirl Foundry & Furnace Co., Bloomington, Ill.
National—Heaters. Mid-Continent Metal Products Co., Chicago, Ill.
National—Pipe, tubing. National Tube Co., United States Steel Corp., Subsidiary, Pittsburgh, Pa.
National—Pipe cutters. Wachs Co., E. H., The, Chicago, Ill.
National Art—Convection radiation, heat exchangers. National Radiator Co., The, Johnstown, Pa.
National-Champion—Furnaces, air heaters. National Heater Co., St. Paul, Minn.
Natur Temp—Insulation. Plastergon Wall Board Co., Buffalo, N. Y.
Naturzone—Insulation. Wilson & Co., Inc., Chicago, Ill.
Navalon—Fiber packing. Johns-Manville, New York, N. Y.
Nelson—Stokers. Heating Assurance, Inc., Spokane, Wash.
Nemo—Insulating cement. Smith & Kanzler Corp., Linden, N. J.
Nesbitt—Heaters. Webster & Co., Warren, Camden, N. J.
New Cyclone—Dust collectors. Kirk & Blum Mfg. Co., Cincinnati, O.
Niagara—Meters. Buffalo Meter Co., Buffalo, N. Y.
Nibco—Fittings, joints, valves. Northern Indiana Brass Co., Elkhart, Ind.
Nibcoloy—Fittings, pipe, stainless steel. Northern Indiana Brass Co., Elkhart, Ind.
Nickelend—Electrodes. Arcos Corp., Philadelphia, Pa.
Nickend—Electrodes. Arcos Corp., Philadelphia, Pa.
Nicloy—Pipe, tubes, tubing. Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Nicuend—Electrodes. Arcos Corp., Philadelphia, Pa.
Nite Cool—Fans. Air Equipment Co., Chicago, Ill.
No Drip—Insulation, protective coatings. J. W. Mortell Co., Kankakee, Ill.
Non-clog—Sewage ejectors and pumps. Chicago Pump Co., Chicago, Ill.
Non-clog—Pipe line strainers. Boylston Steam Specialty Co., Chicago, Ill.
Non-Clogging—Spray nozzles. Link-Belt Co., Chicago, Ill.
Non-Con-Dux—Cement, insulation. Grant Wilson, Inc., Chicago, Ill.
Non-Frost—Insulation. Keasbey & Mattison Co., Ambler, Pa.
Nonisol—Sludge prevention treatment. Alrose Chemical Co., Providence, R. I.
Non-Sweat—Insulation. Keasbey & Mattison Co., Ambler, Pa.
No-Ox-Id—Protective coatings. Dearborn Chemical Co., Chicago, Ill.
Norblo—Dust collectors, fans. Northern Blower Co., Cleveland, O.
No-Rivet—Regulators, dampers. Ohio Products Co., Cleveland, O.
Northwestern—Water heaters. Coe Mfg. Co., Painesville, O.
Northwind—Unit air coolers. Pleasantaire Corp., Washington, D. C.
Norwesco—Cement and compounds, boiler and radiator sealing compounds. Atlas Chemical Co., Marietta, O.
No-Thread—Fittings. Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
No-Vent—Pumps. Stout & Sons, David, St. Louis, Mo.
Novoid—Insulation, adhesives. Cork Import Corp., Englewood, N. J.
Nox-Odor—Odor adsorber. Tamms Industries, Inc., Chicago, Ill.
Nu-Air—Fans, window ventilator units. Meier Electric & Machine Co., Inc., Indianapolis, Ind.
Nu-Alpina—Ventilators. Inland Steel Products Co., Milwaukee, Wis.
Nu-Grip—Shears and snips. Wiss and Sons Co., J., Newark, N. J.
Nullmatic—Gages, indicators, meters, recorders. Moore Products Co., The, Philadelphia, Pa.
Nu-Notch—Mushroom ventilators. Knowles Mushroom Ventilator Co., Upper Montclair, N. J.
Nuvent—Ventilators. Aeolus Dickinson, Chicago, Ill.
Nu-Wood—Insulation. Wood Conversion Co., St. Paul, Minn.

OB—Valves, Ohio Brass Co., Mansfield, O.
O'B-Aid—Compounds. O'Brien Industries, Jersey City, N. J.
O'B-Aige—Water treatment. O'Brien Industries, Jersey City, N. J.
O'B-Col—Compounds. O'Brien Industries, Jersey City, N. J.
O'B-Ox—Water treatment. O'Brien Industries, Jersey City, N. J.
OCH—Filters. American Air Filter Co., Louisville, Ky.
O.E.M.—Flue caps, combustion chambers, cement and compounds. Oil Equipment Mfg. Corp., New Haven, Conn.
Oakwood—Leather belting and v-belts. Baldwin Belting, Inc., New York, N. Y.
Oasis—Electric dehumidifiers. Ebco Mfg. Co., Columbus, O.
O'Burnit—Soot destroyers. O'Brien Industries, Jersey City, N. J.
Octopus—Welding fume exhausters. Chelsea Fan & Blower Co., Inc., Plainfield, N. J.
Ofeldt—Boilers. Mears-Kane-Ofeldt, Inc., Bridgeport, Pa.
Oil-A-Fire—Burners. Automatic Firing Corp., St. Louis, Mo.
Oilbuster—Boiler cleaning compounds. Cannon Chemical Co., Inc., Cambridge, Mass.
Oil-O-Matic—Oil burners. Williams Oil-O-Matic Div., Eureka Williams Corp., Bloomington, Ill.
Oilway—Oil fired heaters. Bastian-Morley Co., Inc., LaPorte, Ind.
Okay Tred—Leather belting. Houghton & Co., E. F., Philadelphia, Pa.
Ol' Faithful—Humidifiers. Maid-O'-Mist, Inc., Chicago, Ill.
One Venturi—Heating systems. Taco Heaters, Inc., Providence, R. I.
Oriflex—Valves. Dunham Co., C. A., Chicago, Ill.
Ovaltube—Gas burners. Beck Engineering Combustion Kompany, St. Louis, Mo.
Oversize—Refrigerant dehydrators. Wabash Mfg. Co., Chicago, Ill.
Oxweld—Welding rod, welding and cutting apparatus. Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Oxyarc—Welding and cutting apparatus. Arcos Corp., Philadelphia, Pa.
Oxycuttend—Electrodes. Arcos Corp., Philadelphia, Pa.
Ozite—Insulation. American Hair & Felt Co., Chicago, Ill.

P. B. H.—Cocks, try cocks. Paul B. Huyette Co., Inc., Philadelphia, Pa.
P-D—Pumps. Peters-Dalton, Inc., Detroit, Mich.
PD—Blowers, dust collectors, heat exchangers, fans. Prat-Daniel Corp., East Port Chester, Conn.
PD QC—Pipe machines. Bignall & Keeler Div., John Ramming Machine Co., St. Louis, Mo.
P & H—Blue print machines. Peck & Harvey, Chicago, Ill.
P & H—Welding electrodes, arc welders. Harnischfeger Corp., Milwaukee, Wis.
P. I. V. Gear—Speed changers. Link-Belt Co., Philadelphia, Pa.
Pacific—Unit Heaters. Palmer Mfg. Corp., Phoenix, Ariz.
Pacific—Furnaces. Rosebraugh Co., W. W., Salem, Ore.
Pacific Coast—Refrigerant dehydrators. Wabash Mfg. Co., Chicago, Ill.
Paco—Pumps. Pacific Pumping Co., Oakland, Calif.
Paintgrip—Sheets. Armco Steel Corp., Middletown, O.
Paladin—Enamels and lacquers. Interchemical Corp., Finishes Div., Newark, N. J.
Palco—Packing. Greene, Tweed & Co., North Wales, Pa.
Palco Wool-Saferized—Insulation. Pacific Lumber Co., The, San Francisco, Calif.
Palmaire—Furnaces, unit heaters, humidifiers. Palmer Mfg. Corp., Phoenix, Ariz.
Palmetto—Packing. Greene, Tweed & Co., North Wales, Pa.
Palmetto Superheat—Gaskets. Greene, Tweed & Co., North Wales, Pa.
Panelray—Gas fired suspended heaters. Day & Night Div., Affiliated Gas Equipment, Inc., Monrovia, Calif.
Pan-L-Grid—Coils and panels. Pan-L-Heat Corp., Portland, Ore.
Par—Air and refrigerating compressors. Lynch Corp., Toledo, O.
Paracoil—Coils, condensers, heaters, oil coolers, pipe nipples, preheaters, steam traps, water chillers, aftercoolers, heating units, valves. Davis Engineering Corp., Elizabeth, N. J.

Paraline—Motor bases. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Parasol—Spray nozzles. Spraying Systems Co., Bellwood, Ill.
Parko—Psychrometers. Parks-Cramer Co., Fitchburg, Mass.
Pathfinder—Belting. Goodyear Tire & Rubber Co., Akron, O.
Pedrifugal—Centrifugal pumps. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Peerless—Pipe machines. Bignall & Keeler Div., John Ramming Machine Co., St. Louis, Mo.
Peerless—Direct radiation. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Peerless—Industrial stokers. Eddy Stoker Corp., Chicago, Ill.
Pelro—Asbestos packing. Greene, Tweed & Co., North Wales, Pa.
Penco—Plastic fittings, pipe. North Penn Co., New York, N. Y.
Penflex-Weld—Absorbers. Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa.
Pennco—Sectional cast iron boilers. Pennsylvania Furnace & Iron Co., Warren, Pa.
Penn Dynafan—Ventilators. Penn Ventilating Co., Philadelphia, Pa.
Penn-M-Co—Fittings. Penn Mfg. Corp., of Washington, Pa., Washington, Pa.
Penn-Power—Ventilators. Penn Ventilating Co., Philadelphia, Pa.
Penn-Turbine—Ventilators. Penn Ventilating Co., Philadelphia, Pa.
Pennsalt—Cleaning compounds. Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Perfection—Hangers and supports. Iwan Brothers, Inc., South Bend, Ind.
Perfection—Plates. Beaton & Cadwell Mfg. Co., New Britain, Conn.
Perfection—Valves. American District Steam Co., North Tonawanda, N. Y.
Perfecto—Boiler parts, cement. Green Fire Brick Co., Mexico, Mo.
Permadine—Protective coatings. American Chemical Paint Co., Ambler, Pa.
PeroNite—Soot destroyers. Perolin Co., Inc., Chicago, Ill.
Petco—Insulating cement, chambers. Peterson Co., B. A., Dowagiac, Mich.
Petro—Oil burners, water heaters. Petroleum Heat & Power Co., Stamford, Conn.
Pexto—Brakes, punches, shears, wrenches, machines. Peck, Stow & Wilcox Co., Southington, Conn.
Pic—Malleable unions. Dart Mfg. Co., E. M., Providence, R. I.
Pic—Steel unions. Fairbanks Co., New York, N. Y.
Pier—Spot welders. Peer, Inc., Benton Harbor, Mich.
Pilotstat—Flame failure controls. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Pioneer—Thermostats. Crown Controls Co., Inc., New Bremen, O.
Pipe Master—Pipe wrenches. Erie Tool Wks., Erie, Pa.
Pipe Master—Pipe cutting machines. Oster Mfg. Co., Cleveland, O.
Pipemaster—Wrenches. Erie Tool Wks., Erie, Pa.
Pipetite—Cements and compounds. Lake Chemical Co., Chicago, Ill.
Pittairaide—Air sterilizing units, Pittsburgh Chemical Laboratories, Inc., Pittsburgh, Pa.
Pittsburgh—Unit heaters. Automatic Gas Equipment Co., Pittsburgh, Pa.
Pittsburgh-National—Meters. Pittsburgh Equitable Meter Div., Rockwell Mfg. Co., Pittsburgh, Pa.
Planeweld—Electrodes. Lincoln Electric Co., The, Cleveland, O.
Plasgon—Cement and compounds. Samuel Cabot, Inc., Boston, Mass.
Plastoid—Furnace cement. Plastic Products Co., Detroit, Mich.
Platecoil—Coils. Kold-Hold Manufacturing Co., Lansing, Mich.
Playford—Stokers. Rosedale Foundry & Machine Co., Pittsburgh, Pa.
Plexifin—Unit heaters. Bayley Blower Co., Milwaukee, Wis.
Plexiform—Fans. Bayley Blower Co., Milwaukee, Wis.
Plexiform Junior—Unit ventilators. Bayley Blower Co., Milwaukee, Wis.
Plicast—Refractories. Plibrico Jointless Firebrick Co., Chicago, Ill.
Plisulate—Insulating cement and insulation. Plibrico Jointless Firebrick Co., Chicago, Ill.
Plumber Krak-Stik—Cement and compounds. Lake Chemical Co., Chicago, Ill.
Plumrite—Pipe. Bridgeport Brass Co., Bridgeport, Conn.
Plymouth—Stokers. Clizbe Bros. Mfg. Co., Plymouth, Ind.
Ply-Tech—Plywood sheets and board. Technical Ply-Woods, Chicago, Ill.
Pneumastat—Aftercoolers. Schramm, Inc., West Chester, Pa.
Pneumatractor—Aftercoolers. Schramm, Inc., West Chester, Pa.
Pneumatronic—Electronic and pneumatic temperature control equipment. Johnson Service Co., Milwaukee, Wis.
Poeco—Insulation. Poe Co., C. W., Cleveland, O.
Polartron—Relays, regulators, switches. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Polymerin—Protective coatings. Interchemical Corp., Finishes Div., Newark, N. J.
Polymeroid—Enamels and lacquers. Interchemical Corp., Finishes Div., Newark, N. J.
Polytherm—Protective coatings. Interchemical Corp., Finishes Div., Newark, N. J.
Pony—Pipe clamps. Adjustable Clamp Co., Chicago, Ill.
Poronze—Filters. Wabash Mfg. Co., Chicago, Ill.
Poro-Stone—Filters. Adams Co., Inc., R. P., Buffalo, N. Y.
Port-A-Pony—Pipe cutting machines. Thread-Ezy Mfg. Co., Corunna, Mich.
Port-A-Pony—Portable pipe cutting machines. Ter-I-Day Sales & Engineering Co., Detroit, Mich.
Porta Drive—Pipe cutting machines. Muncie Gear Wks., Inc., Muncie, Ind.
Porto-Power—Pipe benders and pipe pushers, pumps, punches. Blackhawk Mfg. Co., Milwaukee, Wis.
Porto-Shear—Shears. Van Dorn Electric Tool Co., Towson, Md.
Porto Shears—Shears. Black & Decker Mfg. Co., Towson, Md.
Portovent—Hose. American Ventilating Hose Co., New York, N. Y.
POWair Saver—Propeller fans. Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Poweraire—Furnaces. Jackson & Church Co., Saginaw, Mich.
Powerated—Furnaces. Jackson & Church Co., Saginaw, Mich.
Power—Belting. Rhoads & Sons, J. E., Philadelphia, Pa.
Power Boy—Pipe cutting and threading machines. Oster Mfg. Co., Cleveland, O.
Powercord—Flat belt drives. Gates Rubber Co., The, Denver, Colo.
Power Gems—Boilers. Edge Moor Iron Works, Inc., Edge Moor, Del.
Power-Flame—Leak detectors. Justrite Mfg. Co., Chicago, Ill.
Powermaster—Boilers. Orr & Sembower, Inc., Reading, Pa.
Poweroil—Oil burners. Jackson & Church Co., Saginaw, Mich.
Power-Poise—Electric motors. Brown-Brockmeyer Co., Inc., Dayton, O.
Prasco—Insulation. Pabco Products Inc., San Francisco, Calif.
Pratt & Cady—Valves. R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Precipitron—Air cleaners. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Precision—Nozzles. Benjamin Air Rifle Co., St. Louis, Mo.
Precision Molded—Insulation. Pabco Products Inc., San Francisco, Calif.
Premier—Welding rod. American Steel & Wire Co., United States Steel Corp. Subsidiary, Cleveland, O.
Pre-Notch—Ducts and duct fittings. Gray Metal Products, Inc., Rochester, N. Y.
Prepo—Brazing and soldering torches. Pressure Products Corp., Chicago, Ill.
Pressuregraph—Indicator-controllers, gages, recorders. Electro Products Laboratories, Inc., Chicago, Ill.
Pressure-Link—Gages. J. E. Lonergan Co., Philadephia, Pa.
Pressuretrol—Regulators, switches. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Prestal—Pipe and tube benders. Tal Bender, Inc., Milwaukee, Wis.
Prestico—Furnace cement. Presstite Engineering Co., St. Louis, Mo.
Prest-O-Lite—Leak detectors, torches. Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Presto-Lock—Couplings. Drinkwater, Inc., Waukegan, Ill.
Presto-Matic—Torches. Century Aircraft Co., Los Angeles, Calif.
Prest-O-Weld—Welding and cutting apparatus. Linde Air Products Co., The, New York, N. Y.
Princo—Gages, manometers, psychrometers, regulators, relays, thermometers, thermostats. Precision Thermometer and Instrument Co., Philadelphia, Pa.
Propeloflo—Meters. Builders - Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Protectoglo—Controls, systems. Minneapolis-Honeywell Regulator Co., Instruments Div., Philadelphia, Pa.
Protectomotor—Air filters, separators. Dollinger Corp., Rochester, N. Y.
Protector—Lamps. M-M-A, Inc., Lancaster, Pa.
Protect-O-Ray—Lamps. Lustra Corp. of America, Brooklyn, N. Y.
Protectorelay—Flame failure controls, relays. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Proxlin—Enamels and lacquers. Acme White Lead & Color Works, Detroit, Mich.
Pryzoak—Belting. Graton & Knight Co., Worcester, Mass.
Pul-Air—Ventilators. Lyon, Conklin & Co., Inc., Baltimore, Md.
Pul Air—Ventilators. Penn Ventilating Co., Philadelphia, Pa.
Pulling—Circulators, pumps. Columbus Steam Pump Works Co., Columbus, O.
Pulverzone—Stokers. American Coal Burner Co., Chicago, Ill.
Punkah—Louvers and shutters. White & Sons, Inc., Wilfred O., Boston, Mass.
Puridryer—Dehumidifiers. Pritchard & Co., J. F., Equipment Div., Kansas City, Mo.
Pur-O-Fiers—Separators. Goodyer Industries, Inc., Chicago, Ill.
Pur-O-Cel—Water filters. % Proportioneers, Inc. %, Providence, R. I.
Purox—Welding and cutting apparatus. Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., New York, N. Y.
Pyratherm—Controls. Mercoid Corp., The, Chicago, Ill.
Pyrex—Glass pipe, heat exchangers, gage and sight glasses. Corning Glass Wks., Corning, N. Y.
Pyro—Thermometers, recorders, regulators. Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.
Pyrofax—Propane gas refrigerant. Carbide and Carbon Chemicals Corp., New York, N. Y.
Pyroflex—Coatings, lined pipes, tanks, enamels and lacquers. Knight, Maurice A., Akron, O.
Pyromaster—Regulators. Bristol Co., The, Waterbury, Conn.
Pyrotrol—Flame failure controls. Bristol Co., The, Waterbury, Conn.
Pyrotron—Recorders. Bailey Meter Co., Cleveland, O.
Pyrovisor—Controls. Bristol Co., The, Waterbury, Conn.

QD—Pulleys and sheaves. Worthington Pump & Machinery Corp., Harrison, N. J.
Q-T—Insulation. Celotex Corp., The, Chicago, Ill.
Q-Chromastic—Refractories. Quigley Co., Inc., New York, N. Y.
Q-Chrome—Refractories. Quigley Co., Inc., New York, N. Y.
Quad—Fans. Trade-Wind Motorfans, Inc., Los Angeles, Calif.
Quantrol—Vanes. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
Quartzoid—Sprinkler heads. Grinnell Co., Inc., Providence, R. I.
Quick-as-Wink—Valves. C. B. Hunt & Son, Inc., Salem, O.
Quick-Clip—Insulation fasteners. Nelson Stud Welding Div., Morton Gregory Corp., Lorain, O.
Quick-Label—Identification markers. Brady Co., W. H., Milwaukee, Wis.
Quik-Temp—Steam traps. Schaub Engineering Co., Fred H., Chicago, Ill.
Quintair—Heat exchangers. Pritchard & Co., J. F., Kansas City, Mo.
Quintex—Heat exchangers. Pritchard & Co., J. F., Kansas City, Mo.
Quintube—Heat exchangers. Pritchard & Co., J. F., Kansas City, Mo.

RBC—Roller bearings. Roller Bearing Co. of America, Trenton, N. J.
RB Pressure—Pressure blowers. Western Blower Co., Seattle, Wash.
RC—Couplings. Link-Belt Co., Indianapolis, Ind.
R & G—Grilles, registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
RH—Air conditioning units. McQuay, Inc., Minneapolis, Minn.
R. I.—Unions. Rhode Island Fittings Co., Providence, R. I.
R-K—Combustion control systems, regulators, valves. Ruggles-Klingemann Mfg. Co., Boston, Mass.
R & M—Motors. Robbins & Myers, Inc., Springfield, O.
R-M—Packing. Raybestos-Manhattan, Inc., Passaic, N. J.
R. M. B.—Ball bearings. Landis & Gyr, Inc., New York, N. Y
R & M Moyno—Pumps. Robbins & Myers, Inc, Springfield, O.
R-Mir-Dek—Protective coatings. Miracle Adhesives Corp., New York, N. Y.
R.P.—Air filters, water softeners. Research Products Corp., Madison, Wis.
RTC—Valves. Gold Top Heating, Inc., Butte, Mont.
R-U-F—Fans. Reed Unit-Fans, Inc., New Orleans, La.
R-Z-U Junior—Heaters, fire tube boilers. Fitzgibbons Boiler Co., Inc., New York, N. Y.
Radiafin—Finned tubing, finned surface. Schutte & Koerting Co., Philadelphia, Pa.
Radioflow—Valves. Smolensky Valve Co., Inc., Bedford, O.
Radiant—Direct radiation. Burnham Corp., Boiler Div., Irvington, N. Y.

Radiantrol—Valves. Homestead Valve Mfg. Co., Coraopolis, Pa.
Radi-Aire—Propeller fans. Reynolds Electric Co., River Grove, Ill.
Radi-Ion—Ionization apparatus. Montgomery Bros., San Francisco, Calif.
Radi-Vector—Radiation. Vulcan Radiator Co., Hartford, Conn.
Radolite—Cement, refractories. Pyrolite Products Co., Cleveland, O.
Rador—Thermostats. Vapor Heating Corp., Chicago, Ill.
Raintite—Ventilators. Aeolus Dickinson, Chicago, Ill.
Rajah—Packing. Johns-Manville, New York, N. Y.
Ramapo—Leather belting and v-belts. Baldwin Belting, Inc., New York, N. Y.
Ramset—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.
Ranarex—Analyzers, indicators, recorders. Permutit Co., New York, N. Y.
Rapid—Oil coolers. Bell & Gossett Co., Morton Grove, Ill.
Rapiduction—Pipe cutting machines. Oster Mfg. Co., Cleveland, O.
Ratochlor—Steam and water treatments. Fischer & Porter Co., Hatboro, Pa.
Ratogage—Indicator-controllers, recorder-controllers, recorders. Fischer & Porter Co., Hatboro, Pa.
Ratosight—Alarms, flow switches. Fischer & Porter Co., Hatboro, Pa.
Ratotherm—Gages, indicator-controllers, recorder-controllers, recorders, and thermometers. Fischer & Porter Co., Hatboro, Pa.
Rawl-Anchor—Bolts. Rawlplug Co., Inc., The, New York, N. Y.
Rawldrill—Drills for masonry. Rawlplug Co., Inc., The, New York, N. Y.
Rawl-Drive—Bolts. Rawlplug Co., Inc., The, New York, N. Y.
Rawl Taper—Bolts. Rawlplug Co., Inc., The, New York, N. Y.
Raydiant—Radiation. Weil-McLain Co., Michigan City, Ind.
Rayduct—Pipe. Bethlehem Steel Co., Bethlehem, Pa.
Reading—Fittings, valves. R-P & C Valve Div., American Chain & Cable Co., Inc., Reading, Pa.
Ready-Pack—Clamps. Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Recirculair—Unit heaters. New York Blower Co., Chicago, Ill.
Reco—Accumulators, condensers, headers, heaters, preheaters, tanks, unit coolers. Richmond Engineering Co., Richmond, Va.
Reco—Controllers and starters, motors, propeller fans, switches. Reynolds Electric Co., River Grove, Ill.
Recold—Refrigerating evaporative condensers, coolers, cooling & heating surface, cooling towers, air conditioning units. Refrigeration Engineering, Inc., Los Angeles, Calif.
Reco—Radi-Aire—Fans. Reynolds Electric Co., Chicago, Ill.
Record-O-Stat—Recorder-controllers. Johnson Service Co., Milwaukee, Wis.
Recoy—Chillers, condensers, cooling surface, unit air conditioners and coolers. Refrigeration Economics Co., Inc., Canton, O.
Red—Compressors, controllers and starters, heaters, indicators. operators, regulators, switches, thermostats. Cooper Co., Clark, Palmyra, N. J.
Red Cap—Ventilators, Warner Ventilator Co., La Grange, Ind.
Red Devil—Furnace and pipe joint cement. Pecora Paint Co., Philadelphia, Pa.
Red Diamond—Pipe. American District Steam Co., North Tonawanda, N. Y.
Red-E-Haul—Portable machines. American Die & Tool Co., Inc., Reading, Pa.
Red Flash—Traps. Ellis Drier Co., Chicago, Ill.
Red Head—Tongs. Billings & Spencer Co., Hartford, Conn.
Red Head—Traps. Ellis Drier Co., Chicago, Ill.
Redi-Bends—Coils. Capitol Mfg. & Supply Co., Columbus, O.
Redi—Stokers. General Machinery Co., Spokane, Wash.
Redi-Return—Pumps. American-Marsh Pumps, Inc., Battle Creek, Mich.
Redi-Vac—Pumps. American-Marsh Pumps, Inc., Battle Creek, Mich.
Red Reading Mercury—Hygrometers, psychrometers, thermometers. Palmer Thermometers, Inc., Cincinnati, O.
Red Seal—Engines. Continental Motors Corp., Muskegon, Mich.
Red Socket—Wrenches. Lowell Wrench Co., Worcester, Mass.
Red Top—Humidistats, thermostats. H-B Instrument Co., Philadelphia, Pa.
Red Top—Insulation. United States Gypsum Co., Chicago, Ill.
Redycote—Coatings. Southport Paint Co., Div. Wesson Oil & Snowdrift Co., Inc., Savannah, Ga.
Reformend—Electrodes. Arcos Corp., Philadelphia, Pa.
Refrak Screen—Gas burners. Selas Corp. of America, Philadelphia, Pa.
Rego—Regulators, valves, welding and cutting apparatus. National Cylinder Gas Co., Chicago, Ill.
Reiser—Valves. Homestead Valve Mfg. Co. Coraopolis, Pa.
Relatrol—Heating systems. Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Reliance—Regulators. American Meter Co., Inc., New York, N. Y.
Remote—Indicators. Yarnall-Waring Co., Philadelphia, Pa.
Renewo—Valves. Lunkenheimer Co., Cincinnati, O.
Renu-Vent—Air filters. American Air Filter Co., Inc., Louisville, Ky.
Research—Belting. Graton & Knight Co., Worcester, Mass.
Resiscote—Enamels and lacquers. Reilly Tar & Chemical Corp., Indianapolis, Ind.
Reliance—Leather belting. Chicago Belting Co., Chicago, Ill.
Resistive—Insulation. Infra Insulation, Inc., New York, N. Y.
Revolute—Blueprint machines. Paragon-Revolute Corp., Rochester, N. Y.
Revolving—Heaters. Wing Mfg. Co., L. J., New York, N. Y.
Revolving—Ventilators. Burt Mfg. Co., Akron, O.
Rex—Chain drives, coal and ash conveyors, couplings, nozzles, bearings, pumps. Chain Belt Co., Milwaukee, Wis.
Rex—Fans, ventilators, wheels. Air Controls, Inc., Div. of Cleveland Heater Co., Cleveland, O.
Rexarc—Electrodes. Sight Feed Generator Co., West Alexandria, O.
Rex-Flex—Ducts, hose. Chicago Metal Hose Corp., Maywood, Ill.
Rexoil—Burners, heaters. Reif-Rexoil, Inc., Buffalo, N. Y.
Rex-Tube—Duct connections, duct fittings, hose. Chicago Metal Hose Corp., Maywood, Ill.
Rexvane—Fans. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Rex-Weld—Hose, ducts, duct connections. Chicago Metal Hose Corp., Maywood, Ill.
Ridgevent—Roof ventilators. Octagon Ventilator Co., Chicago, Ill.
Ridgid—Pipe machines, wrenches, cutters, reamers, vises. Ridge Tool Co., Elyria, O.
Rid-Sludge—Cleaning compounds, corrosion treatment. Apex All Weather Products, Chicago, Ill.
Rifco—Unions. Rhode Island Fittings Co., Hillsgrove, R. I.
Riflex—Vibration absorbers. United Metal Hose Co., Inc., Long Island City, N. Y.
Rihco—Humidifiers. Rhode Island Humidifier & Ventilating Co., Boston, Mass.
Rincontrol—Enamels and lacquers. Interchemical Corp., Finishes Div., Newark, N. J.
Rip-pl—Enamels and lacquers. Hilo Varnish Corp., Brooklyn, N. Y.
Ripple-Fin—Cooling and heating surface. McQuay, Inc., Minneapolis, Minn.
Risselt—Air valves, air eliminators. Moreheat Distribution, Inc., Cincinnati, O.
Robinson—Brakes, punches. New Albany Machine Mfg. Co., New Albany, Ind.
Robot-Eye—Regulators, smoke alarms. General Power Plant Corp., New York, N. Y.
Rockwell—Bast gates. Thermix Corp., The, Greenwich, Conn.
Rocop—Heaters. Rome-Turney Radiator Co., Rome, N. Y.
Rodpax—Packing. National Engineering Products, Inc., Washington, D. C.
Ro-Flo—Compressors. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Rolagrip—Couplings. Gustin Bacon Mfg. Co., Kansas City, Mo.
Rol-Air—Tools. Imperial Brass Mfg. Co., Chicago, Ill.
Roll-a-Bend—Pipe benders. Radiant Devices, St. Louis, Mo.
Rollway—Pumps. Pioneer Pump & Mfg. Co., Detroit, Mich.
Roofvane—Ventilators. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Ross—Pipe joints. Webster & Co., Warren, Camden, N. J.
Rosslyn—Duplex tubing. American Cladmetals Co., Carnegie, Pa.
Rotameter—Flow meters. Schutte & Koerting Co., Philadelphia, Pa.
Rotary—Ventilators. Swartwout Co., Cleveland, O.
Roto Blast—Furnaces. Moncrief Furnace Co., Atlanta, Ga.
Roto-Clone—Dust collectors. American Air Filter Co., Inc., Louisville, Ky.
Rotojet—Spray nozzles. Binks Mfg. Co., Chicago, Ill.
Roto-louvre—Dryers. Link-Belt Co., Chicago, Ill.
Rotomet—Solder and fluxes. Rotometals, Inc., San Francisco, Calif.
Rotometric—Solder and fluxes. Rotometals, Inc., San Francisco, Calif.
Roto-Torq—Tools. Richmont, Inc., Los Angeles, Calif.
Roto-trol—Liquid pressure regulators, indicators, and switches. Healy Ruff Co., St. Paul, Minn.
Rotre—Vacuum pumps. Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Ro-Twin—Air compressors. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Royal—Packing. United States Rubber Co., New York, N. Y.
Roxaprene—Protective coatings, enamels and lacquers. Interchemical Corp., Finishes Div., Newark, N. J.
Roxite—Pipe. United States Stoneware Co., New York, N. Y.
Roxyn C—Enamels and lacquers, protective coatings. Interchemical Corp., Finishes Div., Newark, N. J.
Royal—Gas fired heaters. Bastian-Morley Co., Inc., LaPorte, Ind.
Royal Clipper—Cutters and shears. M-M-A, Inc., Lancaster, Pa.
Rubalt—Enamels and lacquers, protective coating. Hague & Co., Alfred, Brookyn, N. Y.
Rubatex—Insulation. Virginia Rubatex Div., Great American Industries, Inc., Bedford, Va.
Rubyfluid—Solder. Ruby Chemical Co., Columbus, O.
Rusco—Insulation. Russell Co., F. C., The, Cleveland, O.
Rust Bloc No. 20—Coatings. Turco Products, Inc., Los Angeles, Calif.
Rustbuster—Cleaning compounds. Cannon Chemical Co., Inc., Cambridge, Mass.
Rust Evade—Coatings. Turco Products, Inc., Los Angeles, Calif.
Rust Raider—Compounds. Radiator Specialty Co., Charlotte, N. C.
Rust Veto—Protective Coatings. E. F. Houghton & Co., Philadelphia, Pa.

S-A—Conveyors, feeders. Stephens-Adamson Mfg. Co., Aurora, Ill.
SA—Valves. Lunkenheimer Co., Cincinnati, O.
S. C.—Air heaters, gas burners, recorders. Surface Combustion Corp., Toledo, O.
S.F.E.—Insulation. Standard Fuel Engineering Co., Detroit, Mich.
S-N—Air conditioning units, burners, fans, heaters, pumps, stokers. Scott-Newcomb, Inc., St. Louis, Mo.
S & P—Burners, governors, preheaters, regulators, strainers, fuel oil units, valves. Staples & Pfeiffer, San Francisco, Calif.
S. R. P.—Protective coatings. Sonneborn Sons, Inc., L., New York, N. Y.
SSIRCO—Ventilators. Southern States Iron Roofing Co., Savannah, Ga.
Saband—Fuel oil treatment. American Sand Banum Co., Inc., New York, N. Y.
Saco—Speed reducers. Stephens-Adamson Mfg. Co., Aurora, Ill.
Saf-Dry—Refrigerants. Liquid Carbonic Corp., The, Chicago, Ill.
Safe-Flo—Heaters. Duffy Engrg. Co., Portland, Ore.
Safe-T-Aire—Air sterilizing units. Hanovia Chemical & Mfg. Co., Newark, N. J.
Safety—Heaters. Wing Mfg. Co., L. J., New York, N. Y.
Saftrol—Controls. Penn Electric Switch Co., Goshen, Ind.
Sahara—Dehumidifiers. Niagara Industrial Corp., New York, N. Y.
Saint Louis—Stokers. Ormsby-Osterman, Inc., St. Louis, Mo.
Sairset—Cement. Green Fire Brick Co., Mexico, Mo.
Sal-Mo—Cement, insulation, packing. Salt Mountain Co., Chicago, Ill.
Sanidaire—Humidifiers. United States Air Conditioning Corp., Minneapolis, Minn.
Santobrite—Water treatment. Monsanto Chemical Co., St. Louis, Mo.
Santocel—Insulation. Monsanto Chemical Co., Merimac Div., Boston, Mass.
Santosite—Water treatment. Monsanto Chemical Co., St. Louis, Mo.
Santrol—Registers. Tuttle & Bailey, Inc., New Britain, Conn.
Saran—Plastic pipe and tubing. Acadia Synthetic Products Div., Western Felt Works, Chicago, Ill.
Satincote—Insulation, building. Insulite Div., Minnesota and Ontario Paper Co., Minneapolis, Minn.
Saunders—Pipe cutters. Erie Tool Works, Erie, Pa.
Saunders—Diaphragm valves. Grinnell Co., Inc., Providence, R. I.
Schmidt—Torches. Minn-Kota Foundry & Mfg. Co., Fargo, N. D.
Schramminc—Aftercoolers. Schramm, Inc., West Chester, Pa.
Schwan—Propeller pumps. Haertel Co., Walter, Minneapolis, Minn.
Schwan—Gas burners. Jamieson Mfg. Co., Dallas, Texas.
Scoggins—Shears and snips. Pacific Machine & Iron Wks., Tacoma, Wash.
Scotch—Adhesive tape. Minnesota Mining & Mfg. Co., St. Paul, Minn.
Scottie Jr.—Boilers. Kewanee Boiler Co., Kewanee, Ill.
Scroll-Aire—Air heaters. Newcomb-Detroit Co., Detroit, Mich.

Scruin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Scru-peller—Sewage ejectors and pumps. Chicago Pump Co., Chicago, Ill.
Sea Lion—Leather belting. Chicago Belting Co., Chicago, Ill.
Sea Rings—Asbestos packing. Johns-Manville, New York, N. Y.
Sealeak—Compounds. Ampion Corp., Long Island City, N. Y.
Seal Master—Bearings. Stephens-Adamson Mfg. Co., Aurora, Ill.
Seal-Rite—Cement and compounds. Macksons Co., New York, N. Y.
Seasonmaker—Air conditioning units. McQuay, Inc., Minneapolis, Minn.
Seismo-Dampers—Bases. Korfund Co., Inc., Long Island City, N. Y.
Selectair—Air conditioning units. Johnson Co., S. T., Philadelphia, Pa.
Selectric—Electric heaters. Bastian-Morley Co., Inc., LaPorte, Ind.
Selectrol—Regulators. Automatic Control Co., St. Paul, Minn.
Sells—Bearings. Royersford Foundry & Machine Co., Royersford, Pa.
Sensatherm—Thermostats. Mercoid Corp., Chicago, Ill.
Sensitrol—Relays. Weston Electrical Instrument Corp., Newark, N. J.
Sentinel—Pumps. Red Jacket Mfg. Co., Davenport, Ia.
Sentry—Draft controls, draft regulators. Krueger Sentry Gauge Co., Green Bay, Wis.
Sep-return—Separators. Wabash Mfg. Co., Chicago, Ill.
Sequestrene—Water softeners. Alrose Chemical Co., Providence, R. I.
Service—Packing. Johns-Manville, New York, N. Y.
Servicecoat—Enamels and lacquers. Debevoise Co., The, Brooklyn, N. Y.
Sesure—Gages. Yarnall-Waring Co., Philadelphia, Pa.
"77"—Pipe coverings. Eagle-Picher Co., Cincinnati, O.
Shafconaire—Unit heaters. Overhead Heaters, Inc., Detroit, Mich.
Shawco—Bends, headers. Shaw Co., Benjamin F., Wilmington, Del.
Sheetrock—Sheets and board for ducts. United States Gypsum Co., Chicago, Ill.
Shelby—Tubing. National Tube Co., United States Steel Corp. Sub., Pittsburgh, Pa.
Shield-Arc—Electrodes, arc welders. Lincoln Electric Co., Cleveland, O.
Shockmounts—Bases and pads. Lord Mfg. Co., Erie, Pa.
Shone—Sewage ejectors. Yeomans Bros. Co., Chicago, Ill.
Shuntflo—Meters. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Shur-Seal—Cement. Chicago Specialty Mfg. Co., Chicago, Ill.
Shutlbrak—Switches. Adam Electric Co., Frank, St. Louis, Mo.
Shut-O-Vent—Louvers and shutters. Reed Unit-Fans, Inc., New Orleans, La.
Signico—Pilot and signal lights. Signal Injector Co., New York, N. Y.
Silastic—Packing. Dow Corning Corp., Midland, Mich.
Silastic—Industrial adhesive tape. Irvington Varnish & Insulator Co., Irvington, N. J.
Silent-Auburn—Burners, heaters, air conditioning units. Auburn Burner Co., Auburn, Ind.
Silent Automatic—Dampers, louvers and shutters. Airecon Industries, Detroit, Mich.
Silentblu—Gas burners. Beck Engineering Combustion Kompany, St. Louis, Mo.
Silent-Breeze—Propeller fans. Holcomb & Hoke Mfg. Co., Inc., Indianapolis, Ind.
Silent Korth—Burners. Eckhart Mfg. Co., Inc., Union, N. J.
Silentvane—Fans. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Sil-Fos—Solder. Handy & Harman, New York, N. Y.
Silicone—Protective coatings. Dow Corning Corp., Midland, Mich.
Silimite—Water treatment. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Sillimanite—Refractories and refractory cement. Taylor Sons Co., Charles, Cincinnati, O.
Silver Comet—Coatings. Southport Paint Co., Div. Wesson Oil & Snowdrift Co., Inc., Savannah, Ga.
Silver Steel—Cutters. E. C. Atkins & Co., Indianapolis, Ind.
Silverstreak—Chain drive. Link-Belt Co., Indianapolis, Ind.
Silver Stream—Spray nozzles. Skinner Irrigation Co., Troy, O.
Silvertop—Eliminators, traps. Anderson Co., V. D., The, Cleveland, O.
Simplex—Gages. Viking Pump Co., Cedar Falls, Ia.
Simplex—Regulators. Bell & Gossett Co., Morton Grove, Ill.
Sim-Trol—Controls. Simplex Mfg. Co., Fond du Lac, Wis.
Sioux—Electric drills. Albertson & Co., Inc., Sioux City, Ia.
Sirocco—Blowers, fans. American Blower Corp., Detroit, Mich.
Skelly—Stokers. Combustion Engineering-Super-Heater, Inc., New York, N. Y.
Skil—Drills, shears. Skilsaw, Inc., Chicago, Ill.
Skilbeck—Humidifiers. Techtmann Industries, Inc., Milwaukee, Wis.
Skip-Tooth—Dies. Nye Tool Co., Chicago, Ill.
Slo-Speed—Reducers. Sterling Electric Motors, Inc., Los Angeles, Calif.
Sludgout—Fuel oil treatment. Metropolitan Refining Co., Inc., Long Island City, N. Y.
Slugin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Smith-Dolan—Electric preheaters and stress relievers. Electric Arc, Inc., Newark, N. J.
Smith-Mills—Boilers. Smith Co., Inc., H. B., Westfield, Mass.
Smoothcote—Insulation, building. Insulite Div., Minnesota & Ontario Paper Co., Minneapolis, Minn.
Snapin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Snap-Rite—Ducts and duct fittings. Gray Metal Products, Inc., Rochester, N. Y.
Sno-Breze—Air conditioning units. Palmer Mfg. Corp., Phoenix, Ariz.
Snug—Radiation. Weil-McLain Co., Michigan City, Ind.
Softweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Solair—Air conditioning units. Northwest Heating, Inc., Portland, Ore.
Solray—Radiation. Weil-McLain Co., Michigan City, Ind.
Sol-vet—Cleaning compounds, water treatment. Anderson-Stolz Corp., Kansas City, Mo.
Sono-O-Seal—Insulation. General Insulating Products Co., Brooklyn, N. Y.
So-Salts—Solder. Turco Products, Inc., Los Angeles, Calif.
Soundliner—Insulation. Baldwin-Hill Co., Trenton, N. J.
Sound-Zorbers—Vibration absorbers. Finn & Co., Inc., T. R., New York, N. Y.
South Wind—Heaters. Stewart-Warner Corp., Heating Div., Indianapolis, Ind.
Sovabead—Dehumidifiers. Socony-Vacuum Oil Co., Inc., New York, N. Y.
Sovereign—Packing. Darcoid Co., Inc., New York, N. Y.
Spartan—Packing, belting. Graton & Knight Co., Worcester, Mass.
Spearhead—Gasket cutters. Zimmerman Packing Co., Cincinnati, O.
Special X—Solder. Industrial Service Laboratories, Milwaukee, Wis.
Speed Clamps—Hose clamps. Tinnerman Products, Inc., Cleveland, O.
Speed Clips—Insulation fasteners. Tinnerman Products, Inc., Cleveland, O.
Speed-Cord—Belt drives. Gates Rubber Co., The, Denver, Colo.
Spee-Dee—Blue print and white print machines. Peck & Harvey, Chicago, Ill.
Speed-Flex—Flat belt drives. Gates Rubber Co., The, Denver, Colo.
Speed Heater—Unit heaters. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Speed Nuts—Locknuts. Tinnerman Products, Inc., Cleveland, O.
Speedomax—Indicator and recorder-controllers, recorders, thermometers. Leeds & Northrup Co., Philadelphia, Pa.
Speed Prime—Pumps. Chain Belt Co., Milwaukee, Wis.
Speed-Trol—Changers. Sterling Electric Motors, Inc., Los Angeles, Calif.
Speedweld—Electrodes. Trindl Products, Ltd., Chicago, Ill.
Speedy—Clamps, cutters, extractors, packing, tools. Chicago Specialty Mfg. Co., Chicago, Ill.
Speedylectric—Boilers, heaters. Livingstone Engineering Co., Worcester, Mass.
Speedyvent—Air eliminators. Livingstone Engineering Co., Worcester, Mass.
Spekaluminite—Coatings. Special Chemicals Corp., New York, N. Y.
Sphero—Blow-off valves. Fairbanks Co., New York, N. Y.
Spinner—Gravity ventilators. Warner Ventilator Co., LaGrange, Ind.
Spinner—Ventilators. Inland Steel Products Co., Milwaukee, Wis.
Spiralock—Pipe coils, tubing. B & M Mfg. Co., East Orange, N. J.
Spiralock—Pulleys and sheaves. Scientiae Tool Co., Dayton, Ohio.
Spiratube—Ducts and duct fittings. Flexible Tubing Corp., Branford, Conn.
Spiraweld—Pipes. Naylor Pipe Co., Chicago, Ill.
Spiro—Heaters. Stout & Sons, David, St. Louis, Mo.
Spirodome—Spray nozzles. Fluor Corp., Ltd., The, Los Angeles, Calif.
Spirovane—Fans. Western Blower Co., Seattle, Wash.
Spongex—Bases and pads, gaskets, insulation. Sponge Rubber Products Co., Shelton, Conn.
Spot-Aire—Air conditioning units. Drayer & Hanson, Inc., Los Angeles, Calif.
Spraco—Booths, nozzles, separators, strainers, washers. Spray Engineering Co., Somerville, Mass.
Spra-Rite—Nozzles. Binks Mfg. Co., Chicago, Ill.
Spray-Acoustic—Insulation. Sprayo Flake Co., Chicago, Ill.
Spraywheel—Air washers. Mountain States Equipment Co., Denver, Colo.
Springin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Square-Heat—Boilers. Kewanee Boiler Corp., Kewanee, Ill.
Stabilflo—Valves. Foxboro Co., Foxboro, Mass.
Stack-Head—Dampers. Air Control Products, Inc., Coopersville, Mich.
Sta-Gloss—Steel sheets. Jessop Steel Co., Washington, Pa.
Stainlend—Electrodes. Arcos Corp., Philadelphia, Pa.
Stainweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Standard—Ventilators. Burt Mfg. Co., Akron, O.
Standardaire—High pressure blowers. Standard Stoker Co., Inc., Erie, Pa.
Standco—Bearings. Standard Pressed Steel Co., Jenkintown, Pa.
Standforated—Grilles. Standard Stamping & Perforating Co., Chicago, Ill.
Starbird—Pressure and vacuum switches. Meletron Corp., Los Angeles, Calif.
Star-Quality—Nipples. Star Tubular Products Co., Chicago, Ill.
Statick—Ventilators. Hirschman-Pohle Co., Inc., Le Roy, N. Y.
Staxauster—Roof ventilators. Allen Ventilator Div., Production Planning Co., Rochester, Mich.
Staynew—Filters. Dollinger Corp., Rochester, N. Y.
Stazin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Steamheat—Heating systems, valves. Radiator Valve Co. of America, Philadelphia, Pa.
Steam-Pak—Steam generator unit, heaters. York-Shipley, Inc., York, Pa.
Steelbestos—Metal sheets. American Steel Band Co., Pittsburgh, Pa.
Steelweld—Brakes, shears. Cleveland Tramrail Div., Cleveland, Crane & Eng. Co., Wickliffe, O.
Steen—Cutters, pipe cleaning machines. Continental Machine Co., Chicago, Ill.
Sterilamp—Lamps. Westinghouse Electric Corp., Pittsburgh, Pa.
Sterlco—Controls, pumps, strainers, regulators, traps, valves. Sterling, Inc., Milwaukee, Wis.
Sterling—Compressors, condensers, valves, pipe coils. Reynolds Mfg. Co., Springfield, Mo.
Stictite—Cement. Refractory & Insulation Corp., New York, N. Y.
Stillson—Pipe wrenches. Erie Tool Works, Erie, Pa.
Stok-A-Fire—Stokers. Automatic Firing Corp., St. Louis, Mo.
Stokerator—Stokers. Northern Steel & Stoker Corp., Peoria, Ill.
Stokerelay—Relays. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Stonewall—Board and sheets. Ruberoid Co., New York, N. Y.
Storm-King—Ducts and duct fittings. Ohio Valley Hardware & Roofing Co., Evansville, Ind.
Storm Shade—Windows. Ingersoll Products Div., Borg-Warner Corp., Chicago, Ill.
Strahman—Boiler gage cocks, valves. Klingerit Inc., New York, N. Y.
Straitflo—Strainers. Hays Mfg. Co., Erie, Pa.
Streamjet—Spray nozzles. Spraying Systems Co., Bellwood, Ill.
Streamline—Couplings, cutters, fittings, heat exchangers, manifolds, nipples, pipe, strainers, tubing, unions, valves. Mueller Brass Co., Port Huron, Mich.
Streamliner—Registers. Auer Register Co., Cleveland, O.
Streamliner—Belting. Gilmer Co., L. H., Div. of United States Rubber Co., Philadelphia, Pa.
Stronghold—Belting. Rhoads & Sons, J. E., Philadelphia, Pa.
Studin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Stud-Pak—Insulation. United States Mineral Wool Co., South Milwaukee, Wis.
Sturdybender—Power brakes. Bath Co., Cyril, The, Cleveland, O.
Submersion—Boilers, water heaters. Stout & Sons, David, St. Louis, Mo.
Sullivan—Controls. Cole-Sewell Engineering Co., St. Paul, Minn.
Sunrad—Direct radiation. American Radiator & Standard Sanitary Corp., Pittsburgh, Pa.
Super Air Screws—Fans. Marathon Electric Mfg. Corp., Wausau, Wis.

Supercutno—Packing. Greene, Tweed & Co., North Wales, Pa.
Super-deLavaud—Pipe. U. S. Pipe & Foundry Co., Burlington, N. J.
Superector—Wrenches. Williams & Co., J. H., Buffalo, N. Y.
Superex—Insulation. Johns-Manville, New York, N. Y.
Super-Felt—Insulation. Johns-Manville, New York, N. Y.
Superfin—Furnaces. American Foundry & Furnace Co., Bloomington, Ill.
Superflux—Solder. Paul-Lewis Laboratories, Inc., Milwaukee, Wis.
Superheat—Gas burners. Selas Corp. of America, Philadelphia, Pa.
Superior—Fans. American Foundry & Furnace Co., Bloomington, Ill.
Superior—Gas fired heaters. Bastian-Morley Co., Inc., LaPorte, Ind.
Super-Power—Drives. Baldwin Belting, Inc., New York, N. Y.
Superratchet—Ratchet Wrenches. Williams & Co., J. H., Buffalo, N. Y.
Superrench—Tools. Williams & Co., J. H., Buffalo, N. Y.
Superseal—Fittings. Grinnell Co., Inc., Providence, R. I.
Super 7—V belts. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Super Silvertop—Traps. The V. D. Anderson Co., Cleveland, O.
Super "66"—Insulation. Eagle-Picher Co., Cincinnati, O.
Supersheat—Gaskets. Greene, Tweed & Co., North Wales, Pa.
Super T—Systems. Tork Clock Co., Mount Vernon, N. Y.
Supertan—Leather belting and v-belts. Baldwin Belting, Inc., New York, N. Y.
Supertemp—Insulation. Eagle-Picher Co., Cincinnati, O.
Supertherm—Heating systems. Ross Engineering Corp., J. O., New York, N. Y.
Super Thermo Stucco—Cement. Chicago Fire Brick Co., Chicago, Ill.
Super-Vacuum Vent—Roof ventilators. Octagon Ventilator Co., Chicago, Ill.
Super X—Sheets. Western Brass Div. of Olin Industries, Inc., East Alton, Ill.
Super X—Coatings. Nelson Mfg. Co., B. F., Minneapolis, Minn.
Sureclor—Feeders. Paddock Engineering Co., of Texas, Dallas, Tex.
Sure Return—Condensation return pumps. Chicago Pump Co., Chicago, Ill.
Sureweld—Electrodes, welders. National Cylinder Gas Co., Chicago, Ill.
Surfamax—Pipe line filters. Micro Metallic Corp., Brooklyn, N. Y.
Sutco—Motors. Sutton Corp., O. A., Wichita, Kan.
Sweatflow—Valves. Quality Specialty Co., Inc., Philadelphia, Pa.
Sylphon—Steam traps. Webster & Co., Warren, Camden, N. J.
Synchro—Valves. The Bristol Co., Waterbury, Conn.
Synchro-Lectric — Viscosimeters. Brookfield Engineering Laboratories, Inc., Stoughton, Mass.
Synchro-Meter—Meters. Bailey Meter Co., Cleveland, O.
Synchron—Motors. Hansen Mfg. Co., Inc., Princeton, Ind.
Synchro-Thermetron—Heating systems. Whittington Pump & Engineering Corp., Indianapolis, Ind.
Synchrotie—Recorders. Westinghouse Electric Corp., Pittsburgh, Pa.
Syncretizer—Unit ventilators. Nesbitt, Inc., John J., Philadelphia, Pa.
Syncrogear—Speed reducers. U. S. Electrical Motors, Inc., Los Angeles, Calif.
Syndolag—Refractories and refractory cement. Basic Refractories, Inc., Cleveland, O.
Syphonaire—Ventilators. Western Engineering & Mfg. Co., Los Angeles, Calif.

T. N.—Valves. Imperial Brass Mfg. Co., Chicago, Ill.
T. T.—Smoke guns. Hill, E. Vernon & Co., Chicago, Ill.
Tabasco—Water heaters. Kewanee Boiler Corp., Kewanee, Ill.
Tag—Hygrometers, gages, indicator-controllers, operators, psychrometers, recorders, regulators, thermometers, valves. Tagliabue Instruments Div. Weston Electrical Instrument Corp., Newark, N. J.
Tampico—Air filters. Chicago Filter Co., Joliet, Ill.
Tampin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Tanco—Insulation, duct, sound deadening. Thompson & Co., Oakmont, Pa.
Tank-Kleen—Fuel oil treatment. Celco Corp., New York, N. Y.
Tank-O-Meter—Gages, indicators. Uehling Instrument Co., Paterson, N. J.
Tanktrol—Regulators. Automatic Control Co., St. Paul, Minn.
Tannate—Belting, packing. Rhoads & Sons, Sons, J. E., Philadelphia, Pa.
Tannate-Rockwood—Belt drives. Rhoads & Sons, J. E.,Philadelphia, Pa.
Tasil—Furnace cement. Taylor Sons Co., Charles, Cincinnati, O.
Tayco—Furnace and refractory cement, refractories. Taylor Sons Co., Charles, Cincinnati, O.
TEG—Humidifiers, sterilizing units. National Air Conditioning Inc., Johnstown, Pa.
Teksag Colloid—Boiler cleaning compounds. Agnew & Tomlinson, Long Island City, N. Y.
Telecator—Gages, recorders and recorder-controllers. Automatic Control Co., St. Paul, Minn.
Telemaster—Relays. Tork Clock Co., Inc., Mt. Vernon, N. Y.
Tellevel—Indicators, switches. Stephens-Adamson Mfg. Co., Aurora, Ill.
Tellite—Alarms. Rochester Mfg. Co., Inc., Rochester, N. Y.
Teltru—Anemometers, gages. Hill, E. Vernon & Co., Chicago, Ill.
Tem-Clock (Electric)—Time switches. Penn Electric Switch Co., Goshen, Ind.
Temflex—Plastic tubing. Irvington Varnish & Insulator Co., Irvington, N. J.
Temlok—Insulation. Armstrong Cork Co., Lancaster, Pa.
Tempmaster—Thermostats. Crown Controls Co., Inc., New Bremen, O.
Tempoint—Thermometers. Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Temproof—Bases and pads. Lord Mfg. Co., Erie, Pa.
Tempscribe—Recorders. Bacharach Industrial Instrument Co., Pittsburgh, Pa.
Temptrol—Insulation. Badham Insulation Co., Inc., Birmingham, Ala.
Temtrol—Thermostats. Penn Electric Switch Co., Goshen, Ind.
Tensulate—Insulation. Tennessee Products and Chemical Corp., Nashville, Tenn.
Terra Therm—Air conditioning units. Webber Engineering Corp., Indianapolis, Ind.
Testite—Fittings. General Fittings Co., Providence, R. I.
Texiron—Pulleys and sheaves. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Texrope—V-belt drives, pulleys, v-belts. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Texslide—Motor bases. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Texsteel—Pulleys and sheaves. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Texolite—Tubing, General Electric Co., Chemical Dept., Pittsfield, Mass.
Tharco—Cement. The Armstrong Co., Detroit, Mich.
Thawzone—Dehydrant and acid neutralizer. Highside Chemicals Co., Clifton, N. J.
Thermalbridge—Thermometers. Thompson Research & Mfg. Co., Davenport, Fla.
Thermal Electric—Heaters, pipe, preheaters, systems, transformers. Fluid Systems, Inc., New Haven, Conn.
Thermalfin—Unit coolers. Thermal Co., Inc., Milwaukee, Wis.
Thermatrol—Valves. Schnacke, Inc., Evansville, Ind.
Therm-Cote—Radiation. Tilco-Fin-Tubing Div., of David E. Kennedy, Inc., Brooklyn, N. Y.
Thermidaire—Furnaces, heaters. Campbell Heating Co., E. K., Kansas City, Mo.
Thermo—Expansion valves. Alco Valve Co., St. Louis, Mo.
Thermo—Heaters. American Furnace Co., St. Louis, Mo.
Thermobank—Systems. Kramer Trenton Co., Trenton, N. J.
Thermobloc—Air heaters. Prat-Daniel Corp., East Port Chester, Conn.
Thermochek—Controls. Bell & Gossett Co., Morton Grove, Ill.
Thermo-Draulik—Operators, regulators. Perfex Corp., Milwaukee, Wis.
Thermodrive—Speedchangers, pulleys and sheaves. Webster Electric Co., Racine, Wis.
Thermoflex—Strainers, heating systems, radiator orifices, traps, valves. Cashin Co., W. D., Boston, Mass.
Thermo-Flow—Heat exchangers. Thermal Industries, Indio, Calif.
Thermofuel—Furnaces. Beck Engineering Combustion Kompany, St. Louis, Mo.
Thermogas—Furnaces. Beck Engineering Combustion Kompany, St. Louis, Mo.
Thermo Grip—Torches. Ideal Industries, Inc., Sycamore, Ill.
Thermoguide—Thermometers. Taylor Instrument Companies, Rochester, N. Y.
Thermo-Humidigraph — Recorder-controllers. Bristol Co., The, Waterbury, Conn.
Thermoil—Furnaces, unit heaters. Beck Engineering Combustion Kompany, St. Louis, Mo.
Thermoil-Granodine—Protective coatings. American Chemical Paint Co., Ambler, Pa.
Thermolator—Valves. Triplex Heating Specialty Co., Inc., Peru, Ind.
Thermolier—Unit heaters. Grinnell Co., Inc., Providence, R. I.
Thermo-Limit—Valves. Alco Valve Co., St. Louis, Mo.
Thermopane—Windows. Libbey-Owens-Ford Glass Co., Toledo, O.
Thermoswitch—Thermostats. Fenwal, Inc., Ashland, Mass.
Therm-o-tile—Conduit. Porter & Co., Inc., H. W., Newark, N. J.
Therm-otrols—Thermometers. Wheelco Instruments Co., Chicago, Ill.
Thermovent—Unit ventilators. Nesbitt, Inc., John J., Philadelphia, Pa.
Thermovoir—Water heaters. Bell & Gossett Co., Morton Grove, Ill.
Thin Man—Registers. Register & Grille Mfg Co., Inc., Brooklyn, N. Y.
Thor—Belting. Goodyear Tire & Rubber Co., Akron, O.
Thor—Drills, pumps, reamers, shears, valve reseaters. Independent Pneumatic Tool Co., Aurora, Ill.
Thorobred—V belts and v belt drives. Dayton Rubber Co., Dayton, O.
Thredolets—Fittings. Bonney Forge & Tool Wks., Allentown, Pa.
3C—Motor controls. Clark Controller Co., Cleveland, O.
Thrift—Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.
Thriftymatic—Draft regulators. Engineered Products Co., Philadelphia, Pa.
Throway—Air filters. American Air Filter Co., Inc., Louisville, Ky.
Thur-Ma-Lox—Coatings. Dampney Co., of America, Hyde Park, Boston, Mass.
Ticotherm—Boilers. Titusville Iron Works Co., The, Titusville, Pa.
Tilt Trap—Steam traps. Nason Co., Detroit, Mich.
Timercoid—Time switches. Mercoid Corp., Chicago, Ill.
Timerelay — Relays. Minneapolis-Honeywell Regulator Co., Minneapolis. Minn.
Time-O-Stat—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Time Saver—Damper regulators. Goese Mfg. Co., Milwaukee, Wis.
Tin-Ezy—Coatings, solder and fluxes. Johnson Mfg. Co., Inc., Mt. Vernon, Ia.
Tin-Loy—Solder. Eagle-Picher Co., Cincinnati, O.
Tiny—Traps. Nason Co., Detroit, Mich.
Titan—Traps. Nason Co., Detroit, Mich.
Tite Seal—Cement and compounds. Radiator Specialty Co., Charlotte, N. C.
Tom Thumb—Pipe machines. Oster Mfg. Co., Cleveland, O.
Toolweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Torchweld—Regulators, valves, welding and cutting apparatus. National Cylinder Gas Co., Chicago, Ill.
Torkflash—Wrenches. Blackhawk Mfg. Co., Milwaukee, Wis.
Tork Master—Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.
Torkotherm—Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.
Torpedo—Dehydrators, filters. Imperial Brass Mfg. Co., Chicago, Ill.
Torqometer—Torque indicating wrenches. Snap-on Tools Corp., Kenosha, Wis.
Torq-Stop—Wrenches. Richmont, Inc., Los Angeles, Calif.
Trace—Refrigerant leak detectors. Highside Chemicals Co., Clifton, N. J.
Transflex—Plastic tubing. Irvington Varnish and Insulator Co., Irvington, N. J.
Transite—Conduit, pipe, ducts and duct fittings, refractories, sheets and board. Johns-Manville, New York, N. Y.
Transparent—Analyzers, gages, manometers. Dwyer Mfg. Co., F. W., Chicago, Ill.
Trap-Dri—Dehydrators. A-P Controls Corp., Milwaukee, Wis.
Trap-it—Filters. A-P Controls Corp., Milwaukee, Wis.
Tray—Cooling towers. New England Cooling Tower Co., Boston, Mass.
Treet-O-Control—Steam system and water treatment. % Proportioneers, Inc. %, Providence, R. I.
Treet-O-Unit—Feeders, pumps. % Proportioneers, Inc. %, Providence, R. I.
Trentweld—Tubing. Trent Tube Co., East Troy, Wis.
Triad—Stocks and dies. Nye Tool & Machine Co., Chicago, Ill.
Tri-Clad—Motors. General Electric Co., Apparatus Dept., Schenectady, N. Y.
Trident—Meters. Neptune Meter Co., New York, N. Y.
Tri-Flex—Registers, grilles. Tuttle & Bailey, Inc., New Britain, Conn.
Tri-Flux—Solder. Wolfe-Kote Co., Inc., Sheboygan, Wis.
Trimo—Cutters, tongs, vises, wrenches. Trimount Mfg. Co., Div. of Aetna Industrial Corp., Boston, Mass.
Trimtherm—Thermostats. General Controls Co., Glendale, Calif.
Triple—Fittings. Parker Appliance Co., The Cleveland, O.
Triple-A—Enamels and lacquers, protective coatings. Quigley Co., Inc., New York, N. Y.
Triple Duty—Heating systems. Bell & Gossett Co., Morton Grove, Ill.
Triple-Seal—Fittings. Imperial Brass Mfg. Co., Chicago, Ill.

Triple Seal—Circulators. Standard Electric Mfg. Co., West Berlin, N. J.
Triplex—Stocks and dies. Nye Tool Co., Chicago, Ill.
Tripl-Mix—Cement. Krehbiel Co., J. H., Chicago, Ill.
Tri-Rotor—Pumps. Yale & Towne Mfg. Co., Stamford, Conn.
Tri-trol—Regulators, Marsh Corp., Jas. P., Skokie, Ill.
Triumph—Gages and indicators. Boston Auto Gage Co., Pittsfield, Mass.
Trojan—Boilers. Burnham Corp., Boiler Div., Irvington, N. Y.
Trojan—Stokers. Auburn Burner Co., Auburn, Ind.
Tropelite—Coatings. Tropical Paint & Oil Co., Cleveland, O.
Tropic-Breeze—Air conditioning units. Dalzen Tool & Mfg. Co., Detroit, Mich.
Tropilux—Enamels and lacquers. Tropical Paint & Oil Co., Cleveland, O.
Tru-Air—Air conditioning units. Blazer, M., & Son, Passaic, N. J.
Truflex—Bi-metals. General Plate Div., Metals & Controls Corp., Attleboro, Mass.
Truliradiant—Gas burners. Gordon & Piatt, Winfield, Kan.
Truliradiant—Gas burners. Gold Top Heating. Inc., Butte, Mont.
Trumark—Protractor for marking pipe. Tru-Line Corp., Los Angeles, Calif.
Try-Me—Regulators, strainers, valves. Tryco Products, Inc., Westfield, Mass.
Tubecote—Protective coatings. Wilhelm Co., A., Reading, Pa.
Tubejet—Compressors, ejector type vacuum pump. Wheeler Mfg. Co., C. H., Philadelphia, Pa.
Tube-Tite—Pipe hangers and supports. Titchener, E. H. & Co., Binghamton, N. Y.
Tuff-Bond—Adhesives, cement. Moore Inc., Goodloe E., Danville, Ill.
Tufflex—Insulation. Wood Conversion Co., St. Paul, Minn.
Tuf-flex—Gage and sight glasses. Libbey-Owens-Ford Glass Co., Toledo, O.
Tuf-On—Protective coatings. Brooklyn Varnish Mfg. Co., Brooklyn, N. Y.
Tulox—Plastic pipe and tubing. Extruded Plastics, Inc., Norwalk, Conn.
Tumblin—Bolts. Star Expansion Bolt Co., New York, N. Y.
Turbine Driven—Heaters. Wing Mfg. Co., L. J., New York, N. Y.
Turblent-Aire—Overfire air jets. Canton Stoker Corp., Canton, O.
Turbo—Air washers, spray nozzles. Bayley Blower Co., Milwaukee, Wis.
Turbo-Flo—Water chillers. Drayer & Hanson, Inc., Los Angeles, Calif.
Turbo Vane—Fans and blowers. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Turbulaire—Dryers. Western Precipitation Corp., Los Angeles, Calif.
Turret—Pumps. Yeomans Bros. Co., Chicago, Ill.
Tu-way—Radiation. Brown Products Co., Forest Hills, N. Y.
Tuway—Strainers. Wright-Austin Co., Detroit, Mich.
20th Century—Bearings. Roller Bearing Co., of America, Trenton, N. J.
Twin Contact—Controls, switches, thermostats. Perfex Corp., Milwaukee, Wis.
Twindow—Heat insulating windows. Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Twin G-Fin—Preheaters. Griscom-Russell Co., The, New York, N. Y.
Twin-Line—Pumps. Cooper-Bessemer Corp., The, Mt. Vernon, O.
Twin Seal—Check valves, gage testers. Mansfield & Green, Cleveland, O.
Tygon—Protective coatings, plastic tubing. U. S. Stoneware Co., New York, N. Y.
Tylox—Pipe couplings. United States Stoneware Co., New York, N. Y.
Tymit—Switches. Tork Clock Co., Inc., Mt. Vernon, N. Y.

U S—Fittings, flanges, tank plugs. U. S. Plug & Fitting Co., Cleveland, O.
U. S.—Heaters. United States Radiator Corp., Detroit, Mich.
US-Capitol—Boilers, hangers or brackets, heaters, radiation. United States Radiator Corp., Detroit, Mich.
US-Capitolaire—Air conditioning units. United States Radiator Corp., Detroit, Mich.
USG—Louvers and shutters. United States Gypsum Co., Chicago, Ill.
U. S. S.—Angles, sheets. United States Steel Co., Pittsburgh, Pa.
U. S. S.—Pipe, tubing. National Tube Co., United States Steel Corp., Subsidiary, Pittsburgh, Pa.
U-S-S—Sheets, angles. Columbia Steel Co., United States Steel Corp., Subsidiary, San Francisco, Calif.
USS—Sheets. Tennessee Coal, Iron & Railroad Co., United States Steel Corp. Subsidiary, Birmingham, Ala.
UTA—Pumps. American-Marsh Pumps, Inc., Battle Creek, Mich.
Ugasco—Gaskets. United States Gasket Co., Camden, N. J.
U-Loy—Sheets. Republic Steel Corp., Cleveland, O.
Ultralite—Insulation. Gustin Bacon Mfg. Co., Kansas City, Mo.
Unaflow—Steam engines. Ames Iron Works, Div. of Pierce Butler Radiator Corp., Oswego, N. Y.
Unarco—Insulation, gaskets, packing, Insulating cement. Union Asbestos & Rubber Co., Cicero, Ill.
Unbrako—Repair plugs. Standard Pressed Steel Co., Jenkintown, Pa.
Unibestos—Insulation. Union Asbestos & Rubber Co., Cicero, Ill.
Unichrome—Enamels and lacquers. United Chromium, Inc., New York, N. Y.
Uniclosed—Electric motors. U. S. Electrical Motors, Inc., Los Angeles, Calif.
Unicoils—Air conditioning unit. Clarage Fan Co., Kalamazoo, Mich.
Unicon—Refrigerating condensers. Kramer Trenton Co., Trenton, N. J.
Uniduct—Ducts and duct fittings. General Corporation, Minneapolis, Minn.
Uni-fin—Grilles, registers. Barber-Colman Co., Rockford, Ill.
Uniflare—Fittings. Scovill Mfg. Co., Waterbury, Conn.
Uniflex—Metal hose. Brockway Co., Naugatuck, Conn.
Uni-flo—Dampers, diffusers, grilles, registers. Barber-Colman Co., Rockford, Ill.
Uniflow—Oil burners. Ace Engineering Co., Chicago, Ill.
Unipack—Welding fume exhausters, centrifugal fans. American Machine Products Co., Marshalltown, Ia.
Uni-Pull—Flat belt drives. Rhoads & Sons, J. E., Philadelphia, Pa.
Unipump—Pumps. Weinman Pump Mfg. Co., Columbus, O.
Unishears—Electric shears. Stanley Electric Tools, Div. of The Stanley Works, New Britain, Conn.
Unisorb—Bases and pads. Felters Company, The, Boston, Mass.
Unitair—Air compressors. Joy Mfg. Co., Pittsburgh, Pa.
Unitaire—Air conditioning units. Westinghouse Electric Corp., Sturtevant Div., Boston, Mass.
Unitem—Heaters. Bell & Gossett Co., Morton Grove, Ill.
Unitherm—Unit heaters. Clarage Fan Co., Kalamazoo, Mich.
UniTrane—Air conditioning units. Trane Co., The, La Crosse, Wis.
Unitype—Pumps. Pacific Pumping Co., Oakland, Calif.
Universal—Benders. Hossfeld Mfg. Co., Winona, Minn.
Universal—Burners. Dalzen Tool & Mfg. Co., Detroit, Mich.
Universal—Cast iron pipe. Central Foundry Co., New York, N. Y.
Universal—Centrifugal pumps. Bell & Gossett Co., Morton Grove, Ill.
Universal—Gas and oil burners. Mettler Co., Inc., The, Los Angeles, Calif.
Universal—Packing. Johns-Manville, New York, N. Y.
Universal—Pipe cutters. Nye Tool Co., Chicago, Ill.
Universal—Regulators. Dockson Corp., Detroit, Mich.
Universal Unaflow—Engines. Skinner Engine Co., Erie, Pa.
Uni-Wash—Dust collectors. Newcomb-Detroit Co., Detroit, Mich.
Upson—Bolts and studs. Republic Steel Corp., Bolt & Nut Div., Cleveland, O.
usAIRco—Air conditioning equipment, blowers, condensers, dehumidifiers, fans, grilles, heaters. United States Air Conditioning Corp., Minneapolis, Minn.
Uskon—Conductors. United States Rubber Co., New York, N. Y.
Utility—Blowers. American Blower Corp., Detroit, Mich.
Utility—Roof ventilators. Arex Co., Chicago, Ill.
Utility—Heaters. Wing Mfg. Co., L. J., New York, N. Y.

V*S—Changers. Reliance Electric & Engineering Co., Cleveland, O.
Vacumatic—Ejectors, pumps. Whittington Pump & Engineering Corp., Indianapolis, Ind.
Vacuumstat—Switches. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Vad—Cooling towers. Young Radiator Co., Racine, Wis.
Vairflo—Cooling towers. Marley Co., Inc., The, Kansas City, Kan.
Valcalox—Damper regulators, Young Regulator Co., Cleveland, O.
Valdura—Enamel. American-Marietta Co., Chicago, Ill.
Valvactor—Valve operators. Foxboro Co., Foxboro, Mass.
Valvent—Roof ventilators, Swartwout Co., Cleveland, O.
Valvrator—Valves. Fischer & Porter Co., Hatboro, Pa.
Vapomaster—Air sterilizing units. Robertson Sons, Inc., M. F., Lansdowne, Pa.
Vapomatic—Sterilizing units. Robertson Sons, Inc., M. F., Lansdowne, Pa.
Vaporene—Corrosion inhibition. Metropolitan Refining Co., Inc., Long Island City, N. Y.
VapoRette—Sterilizing units. Robertson Sons, Inc., M. F., Lansdowne, Pa.
Vapor-Clarkson—Heating and process boilers. Vapor Heating Corp., Chicago, Ill.
Vaporstat—Switches. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Va-pur-izer—Room type unit humidifiers. Crowell & Dunn, Inc., New York, N. Y.
Varidrive—Speed changers. U. S. Electrical Motors, Inc., Los Angeles, Calif.
Varipitch—Pulleys and sheaves. Gates Rubber Co., The, Denver, Colo.
Vari-Pitch—Speed changers, pulleys and sheaves. Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Vari-Vac—Heating systems. Dunham Co., C. A., Chicago, Ill.
Vari-Vent—Valves. Dole Valve Co., Chicago, Ill.
Vaultmaster—Air conditioning units. Haertel Co., Walter, Minneapolis, Minn.
Veeco—Leak detectors. Vacuum-Electronic Engineering Co., Brooklyn, N. Y.
Vee Jet—Spray nozzles. Spraying Systems Co., Bellwood, Ill.
Veelos—V-belts. Manheim Mfg. & Belting Co., Manheim, Pa.
Velometer—Air velocity meters, anemometers. Illinois Testing Laboratories, Inc., Chicago, Ill.
Ventalarm—Alarms, gages. Scully Signal Co., Cambridge, Mass.
Ventfab—Connections, duct, flexible. Iden Mfg. Co., Chicago, Ill.
Vento—Traps. Haines & Co., Inc., William S., Div. Sellers Injector Corp., Philadelphia, Pa.
Vent-Rite—Air valves. Anderson Products, Inc., Cambridge, Mass.
Ventube—Ducts and duct fittings. E. I. du Pont de Nemours & Co., Inc., Fabrics & Finishes Dept., Wilmington, Del.
Ventura—Fans. American Blower Corp., Detroit, Mich.
Venturafin—Unit heaters. American Blower Corp., Detroit, Mich.
Venturi—Fan housings. Commercial Shearing & Stamping Co., Youngstown, O.
Venturi—Meters. Builders-Providence, Inc., Div. of Builders Iron Foundry, Providence, R. I.
Venturi-Flo—Air diffusers. Barber-Colman Co., Rockford, Ill.
Vent-Vac—Heating systems. Anderson Products, Inc., Cambridge, Mass.
Verco—Insulating cement. Nelson Mfg. Co., B. F., Minneapolis, Minn.
Vercoustic—Insulation. Nelson Mfg. Co., B. F., Minneapolis, Minn.
Vermiculite—Insulation. International Vermiculite Co., Girard, Ill.
Vernier-Set—Time switches. Automatic Temperature Control Co., Inc., Philadelphia, Pa.
Versalend—Arc welding electrodes. Arcos Corp., Philadelphia, Pa.
Versa-Liners—Blue and white print machines. Peck & Harvey, Chicago, Ill.
Vertical—Unit heaters. American Blower Corp., Detroit, Mich.
Vertiflow—Unit heaters. Young Radiator Co., Racine, Wis.
V-Flat—Pulleys and sheaves. Dayton Rubber Co., Dayton, O.
Vibracork—Bases and pads. Korfund Co., Inc., Long Island City, N. Y.
Vibracork—Vibration absorbers. Finn & Co., Inc., T. R., New York, N. Y.
Vibrasafe—Absorbers. Pleasantaire Corp., Washington, D. C.
Vibrashock—Bases and pads. Robinson Aviation, Inc., Vibrashock Div. Teterboro, N. J.
Vibra-sorber—Vibration absorbers. Chicago Metal Hose Corp., Maywood, Ill.
Vibro-Bar—Bases and pads. Korfund Co., Inc., Long Island City, N. Y.
Vibro-Hangers. Pipe hangers and supports. Korfund Co., Inc., Long Island City, N. Y.
Vibro Insulators—Bases. Goodrich Co., B. F., Akron, O.
Vibro-Isolator—Bases and pads. Korfund Co., Inc., Long Island City, N. Y.
Victor—Traps. Wright-Austin Co., Detroit, Mich.
Victory—Registers. Register & Grille Mfg. Co., Inc., Brooklyn, N. Y.
Victron—Electric motors, louvers and shutters. Victor Electric Products, Inc., Cincinnati, O.
Vim—Gaskets, leather packing. Houghton & Co., E. F., Philadelphia, Pa.
Vim Tred—Leather belting. Houghton & Co., E. F., Philadelphia, Pa.
Vinyl—Coatings. Gates Engineering Co., Wilmington, Del.
Visaflame—Controls. Mercoid Corp., The, Chicago, Ill.
Visco—Preheaters. Crotty Mfg. Corp., Long Island, N. Y.
Viscorator—Viscosimeters. Fischer & Porter Co., Hatboro, Pa.

Visi Flo—Sight glasses. O P W Corp., Cincinnati, O.
VisOdry—Dehydrators. Western Thermal Equipment Co., Los Angeles, Calif.
Visoleak—Detectors. Western Thermal Equipment Co., Los Angeles, Calif.
Vistand—Vise stands. Armstrong Mfg. Co., Bridgeport, Conn.
Vitalloy—Wrenches. Billings & Spencer Co., Hartford, Conn.
Vitra-Carlite—Enamels and lacquers. Hilo Varnish Corp., Brooklyn, N. Y.
Vitricel—Refractories. Carey Mfg. Co., Philip, The, Lockland, Cincinnati, O.
Vitriram—Furnace cement. U. S. Stoneware Co., New York, N. Y.
Vix-Syn—Rubber and synthetic packing. Houghton & Co., E. F., Philadelphia, Pa.
V-Meth-L—Refrigerants. Virginia Smelting Co., West Norfolk, Va.
Voladjuster—Dampers. Barber-Colman Co., Rockford, Ill.
Volcano—Ventilators. Iwan Brothers, South Bend, Ind.
Volocitrol—Louvers, regulators. Barber-Colman Co., Rockford, Ill.
Vornado—Fans. Sutton Corp., O. A., Wichita, Kan.
Vortex—Pumps. Lawrence Pump & Engine Co., Lawrence, Mass.
Vortex—Nozzles. Phillips Cooling Tower Co., Inc., Brooklyn, N. Y.
V-to-V—Pulleys and sheaves. Dayton Rubber Co., Dayton, O.
Vulcalock—Fittings, pipe, tanks, valves. Goodrich Co., B. F., Akron, O.
Vulcan—Stands, tongs, vises. Williams & Co., J. H., Buffalo, N. Y.
Vulcan—Stokers. Canton Stoker Corp., Canton, O.
Vulcan Superior—Tongs, vises. Williams & Co., J. H., Buffalo, N. Y.
Vulco—Belts, drives, pulleys. Gates Rubber Co., Denver, Colo.
Vulco Mount—Pulleys. Gates Rubber Co., Denver, Colo.
Vynal—Coatings. Watson-Standard Co. Pittsburgh, Pa.
Vyncote—Coatings. Watson-Standard Co., Pittsburgh, Pa.

W. & McD.—Strainers. Watson & McDaniel Co., Philadelphia, Pa.
W-S—Fittings. Watson-Stillman Co., Roselle, N. J.
W & T—Anemometers, feeders, gages, indicators, hygrometers, dew point recorders, meters, relays. Wallace & Tiernan Co., Inc., Newark, N. J.
W & W—Pipe hangers. Western Wire Products Co., St Louis, Mo.
Wakefield—Fittings, pipe, pumps, tanks and valves. Lead Lined Iron Pipe Co., Wakefield, Mass.
Walco-Parmelee—Wrenches. Walworth Co., New York, N. Y.
Walltube—Radiator brackets. Arjac Products Inc., Rochester, N. Y.
Walseal Silbraz—Fittings, valves. Walworth Co., New York, N. Y.
Walvector—Radiations. Webster & Co., Warren, Camden, N. J.
Warco—Combustion chambers, refractories. Walsh Refractories Corp., St. Louis, Mo.
Warco—Valves. Bridgeport Brass Co., Bridgeport, Conn.
Warco—Fuel oil treatment. Warren Refining & Chemical Co., The, Cleveland, O.
Warcolite—Enamels and lacquers. Warren Refining & Chemical Co., The, Cleveland, O.
Wat-a-mat—Water meters. Pfening Co., Fred D., Columbus, O.
Watco—Cooling towers, humidifiers, spray nozzles, spraying systems. Water Cooling Corp., New York, N. Y.
Water-Boy—Feeders, alarms, valves. Maid-O'-Mist, Inc., Chicago, Ill.
Water-King—Pumps. Peerless Pump Div., Food Machinery and Chemical Corp., Los Angeles, Calif.
Water-Maker—Water heaters. Catskill Metal Works, Inc., Catskill, N. Y.
Waterspar—Enamels and lacquers. Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Watrola—Water heaters. George E. Swett & Co., San Francisco, Calif.
Way Loctor—Doors and panels. Walsh, The, L. M., Co., Boston, Mass.
Wear-Proof—Pumps. Schneible Co., Claude B., Detroit, Mich.
Wearweld—Electrodes. Lincoln Electric Co., Cleveland, O.
Weather-Chron—Time switches. Automatic Devices Co., Inc., Chicago, Ill.
Weathermaker—Unit coolers, unit air conditioners. Carrier Corp., Syracuse, N. Y.
Weathermaster—Unit air conditioners. Carrier Corp., Syracuse, N. Y.
Weather-Man—Regulators, switches, thermostats. Automatic Devices Co., Inc., Chicago, Ill.
Weatherstat—Thermostats. Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Weatherwood—Insulation, sheets and board. United States Gypsum Co., Chicago, Ill.
Webco—Brakes. Webb Machine & Tool Co., Imperial, Pa.
Webster-Nesbitt—Unit heaters. Webster & Co., Warren, Camden, N. J.
Webster-Nesbitt "Little Giant"—Unit heaters. Nesbitt, Inc., John J., Philadelphia, Pa.
Weco—Gas burners. Webster Engineering Co., Tulsa, Okla.
Wedgbelt—V belts and v-belt drives, pulleys. American Pulley Co., Philadelphia, Pa.
Weir—Stokers. Meyer Furnace Co., The, Peoria, Ill.
Weiralead—Lead alloy coated sheets. Weirton Steel Co., Weirton, W. Va.
Weir-Meyer—Furnaces. Meyer Furnace Co., The, Peoria, Ill.
Weirzin—Electrolytic zinc coated sheets. Weirton Steel Co., Weirton, W. Va.
Weldells—Welding fittings. Taylor Forge & Pipe Works, Chicago, Ill.
Weldolets—Fittings. Bonney Forge & Tool Works, Allentown, Pa.
WesCo—Solenoids. West Coast Electric Mfg. Co., Los Angeles, Calif.
Western—Fans, furnaces, heaters. International Sales Co., San Francisco, Calif.
Westernaire—Fans. Western Engineering & Mfg. Co., Los Angeles, Calif.
Western Rotary—Ventilators. Western Engineering & Mfg. Co., Los Angeles, Calif.
Westo—Water treatment. Western Chemical Co., Kansas City, Mo.
Whirlcone—Spray nozzles. Water Cooling Equipment Corp., St. Louis, Mo.
Whirljet—Spray nozzles. Spraying Systems Co., Bellwood, Ill.
Whisper-Quiet—Heaters. Zink Co., John, Tulsa, Okla.
Whitson—Steam traps. Healy Ruff Co., St. Paul, Minn.
Whiz—Drills. Paramount Products Co., New York, N. Y.
Wilco—Bi-metals. Wilson Co., H. A., The, Newark, N. J.
Wilco—Pipe cutting machines. Oster Mfg. Co., Cleveland, O.
Williams-Hager—Valves. Williams Gauge Co., The, Pittsburgh, Pa.
Wilmington—Air compressors. Electric Sprayit Co., The, Sheboygan, Wis.
Windial—Anemometers. Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md.
Windmotor—Roof ventilators. Airecon Industries, Detroit, Mich.
Wind-O-Cool—Fans. Belter Electric Mfg. Co., G. J., The, St. Louis, Mo.
Wind-O-Vent—Window ventilator and filter units. Reed Unit-Fans, Inc., New Orleans, La.
Wingfoil—Ventilators. Wing Mfg. Co., L. J., Linden, N. J.
Winkler—Burners, stokers. U. S. Machine Corp., Lebanon, Ind.
Winter-Chaser—Air conditioning units, furnaces, heaters. Campbell Heating Co., Des Moines, Ia.
Wissco—Grilles. Wickwire Spencer Steel Div. of Colorado Fuel & Iron Corp., New York, N. Y.
Witch—Bolts, clamps, hangers, protectors. Carpenter & Paterson, Inc., East Boston, Mass.
Wolf-Linde—Compressors, condensers, fittings, valves. Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Wolverine—Heat exchangers, unit heaters, air conditioning units. Airecon Industries, Detroit, Mich.
Wonder—Tubing benders. American Pipe Bending Machine Co., Inc., Poultney, Vt.
Wovenstone—Pipe insulation. Union Asbestos & Rubber Co., Cicero, Ill.
Wraplock—Hose clamps. Actus Corp., Mt. Vernon, N. Y.
Wrap-On—Pipe insulation. Gro-Quick Co., Chicago, Ill.

X-L—Gaskets, packing. Excelsior Leather Washer Co., Rockford, Ill.
Xacto—Meters. Bowser, Inc., Fort Wayne, Ind.
"X" Boilerliquid—Compounds. X Laboratories, Inc., New York, N. Y.
"X" Flush-Rustoff—Boiler cleaning compounds. X Laboratories, Inc., New York, N. Y.
"X" Pipejoin—Cement and compounds. X Laboratories, Inc., New York, N. Y.
Xit—Ventilators. Iona Ventilator Co., Inc., Philadelphia, Pa.

Yager's—Solder. Benson Co., Inc., Alex R., Hudson, N. Y.
Yarway—Alarms, clamps, expansion joints, recorders, nozzles, strainers, traps, valves. Yarnall-Waring Co., Philadelphia, Pa.
Yellow-Jacket—Heating boilers. Burnham Corp., Boiler Div., Irvington, N. Y.
Yemco—Water heaters. York Electric & Machine Co., York, Pa.
Yoloy—Pipe, sheet, tubing. Youngstown Sheet & Tube Co., Youngstown, O.
Yorkaire—Unit air coolers. York Corp., York, Pa.
York-Power—Oil burners. York-Shipley, Inc., York, Pa.

Zapon—Enamels and lacquers. Atlas Powder Co., North Chicago, Ill.
Z-Crete—Pipe insulation. Zonolite Co., Chicago, Ill.
Zephyrweld—Pipe fittings. Tri-Clover Machine Co., Kenosha, Wis.
Zero—Cement, refractories. Standard Fuel Engineering Co., Detroit, Mich.
Zerolite—Insulation. Johns-Manville, New York, N. Y.
Zig Zag—Heat exchangers. Stout & Sons, David, St. Louis, Mo.
Zinaloy—Zinc sheets. Matthiessen & Hegeler Zinc Co., La Salle, Ill.
Zincgrip—Sheets. Armco Steel Corp., Middletown, O.
Zincilate—Coatings. Industrial Metal Protectives, Inc., Dayton, O.
Zinc Soot—Soot destroyers. Tamms Industries, Inc., Chicago, Ill.
Zinodine—Protective coatings. American Chemical Paint Co., Ambler, Pa.
Zipcoat—Protective coatings. Dresser Mfg. Div., Dresser Industries, Inc., Bradford, Pa.
Zircon—Furnace and refractory cement, refractories. Taylor Sons Co., Charles, Cincinnati, O.
Zone-Master—Heating systems. General Heaters & Regulators Co., Chicago, Ill.
Zone-Pac—Heating systems. Barber-Colman Co., Rockford, Ill.

DIRECTORY SECTION

HEATING, PIPING, AND AIR CONDITIONING EQUIPMENT FOR INDUSTRY AND LARGE BUILDINGS

PART 3

MANUFACTURERS' ADDRESSES

For the complete name and address of any manufacturer look here in Part 3.

• The manufacturers whose names are spotted throughout the listings advertise in this issue. See Index to Advertisers (on page 127d) for the page on which you will find the advertising of any of these manufacturers.

Heating, Piping & Air Conditioning
6 N. Michigan Ave.
Chicago 2, Illinois

A

A. & A. Register Co., 8327 Clinton Rd., Cleveland 9, O.
●A-J Mfg. Co., 2119 Washington St., Kansas City 8, Mo.
A-P Controls Corp., 2460 N. 32nd St., Milwaukee 10, Wis.
Abart Gear & Machine Co., 4828-36 W. 16th St., Chicago 50, Ill.
Acadia Synthetic Products Div., Western Felt Works, 4115 Ogden Ave., Chicago, Ill.
Accurate Sheet Metal Mfg. Works, 2336-40 Milwaukee Ave., Chicago 47, Ill.
Ace Electric Corp., Bedford, Ind.
●Ace Engineering Co., 1435 W. 15th St., Chicago 8, Ill.
Acer & Whedon, Inc., Medina, N. Y.
Acheson Mfg. Co., Braddock P. O., Rankin, Pa.
Acker Organization, Inc., W. M., 3167 Fulton Rd., Cleveland 9, O.
Ackermann Mfg. Co., Wheeling, W. Va.
Acme Asbestos Covering & Flooring Co., 236 N. Elizabeth St., Chicago 7, Ill.
Acme Electric Welder Co., 2618 Fruitland Ave., Los Angeles 58, Calif.
Acme Equipment Co., 205-13 E. Broadway, Muskogee, Okla.
●Acme Industries, Inc., Cor. Mechanic and Ganson Sts., Jackson, Mich.
Acme Mfg. Co., State Rd. below Rhawn St., Holmesburg, Philadelphia 36, Pa.
Acme Refining Co., The, W. 56th & W. & L. E. Ry., Cleveland, O.
Acme Steel Co., 2840 Archer Ave., Chicago 8, Ill.
Acme White Lead & Color Works, 8250 St. Aubin Ave., Detroit 11, Mich.
Acorn Refining Co., 8001 Franklin Ave., Cleveland, O.
Acro Mfg. Co., The, 2040 E. Main St., Columbus, O.
Acro Welder Mfg. Co., 1825 W. St. Paul Ave., Milwaukee 3, Wis.
Acrow, Inc., 155 Washington St., Newark, N. J.
Actus Corp., Mount Vernon, N. Y.
Adam Electric Co., Frank, 3650 Windsor St., St. Louis, Mo.
Adams Co., The, E. 4th St., P. O. Box 268, Dubuque, Ia.
Adams Co., Inc., R. P., 225-7 E. Park Dr., Buffalo 17, N. Y.
Adjustable Clamp Co., 417 N. Ashland Ave., Chicago 22, Ill.
Adelta Mfg. Co., Inc., 21 & Ellsworth, Philadelphia 46, Pa.
Advance Aluminum Castings Corp., 2742 W. 36th Pl., Chicago 32, Ill.
Advance Electric & Relay Co., 2435 N. Naomi St., Burbank, Calif.
Advance Fan & Blower Co., 3428 Bagley, Detroit, Mich.
Aero-Coupling Corp., 1053 N. Hollywood Way, Burbank, Calif.
●Aerofin Corp., 410 S. Geddes St., Syracuse 1, N. Y.
Aeroil Products Co., Inc., Wesley St., South Hackensack, N. J.
Aeromatic Propeller Dept., Koppers Co., Inc., Baltimore 3, Md.
Aeroquip Corp., 300 S. East Ave., Jackson, Mich.
Aerotec Corp., The, Greenwich, Conn.
Aerovent Fan Co., Inc., 710 E. Ash St., Piqua, O.
Agaloy Tubing Co., Springfield, O.
Aget-Detroit Co., 613 First National Bank Bldg., Ann Arbor, Mich.
Agnew Electric Co., Milford, Mich.
Agnew & Tomlinson, 10-26 Jackson Ave., Long Island City 1, N. Y.
Ahlberg Bearing Co., 3081 W. 47th St., Chicago 32, Ill.
Air-Aid Corp., 350 Fifth Ave., New York 1, N. Y.
●Air Conditioning Products Co., 2340 W. Lafayette Blvd., Detroit 16, Mich.
Air Control Products, Inc., Coopersville, Mich.
Air Controls, Inc., Div. of Cleveland Heater Co., 2310 Superior Ave., Cleveland 14, O.
Aircraft Fitting Co., 1400 E. 30 St., Cleveland 14, O.
●Air Devices, Inc., 17 E. 42nd St., New York 17, N. Y.
Air Equipment Co., 1713 W. Carroll Ave., Chicago 12, Ill.
Air Equipment Co., 2730 Zuni St., Denver, Colo.
Air Filter Corp., 108 N. Water St., Milwaukee 2, Wis.
Air Purification Service, Inc., 136 Liberty St., New York, N. Y.
Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y.
●Air & Refrigeration Corp., 475 Fifth Ave., New York 17, N. Y.
Air Vent Corp., 403 E. 62nd St., New York, N. Y.
Airecon Industries, 2536 14th St., Detroit 16, Mich.
Aire-Foile Fan & Blower Co., 2909 Central Ave., Detroit 9, Mich.
Airgard Mfg. Co., 362 W. Erie St., Chicago 10, Ill.
Airjet Ventilator Co., 380 Plumosa Dr., Pasadena 10, Calif.
Airkem, Inc., 241 E. 44 St., New York 17, N. Y.
Airmaster Corp., 4317 Ravenswood Ave., Chicago 13, Ill.
Air-Maze Corp., 5200 Harvard Ave., Cleveland 5, O.
Air-O-Cel Co., 22000 Woodward Ave., Detroit 20, Mich.
Air-Stream Filter Corp., 2100 Washington Ave., St. Louis 3, Mo.
●Airtherm Mfg. Co., 711 S. Spring Ave., St. Louis 10, Mo.
Airwasher Corp., 1122 N. Washington Ave., Lansing, Mich.
Ajax Corp. of America, 176 W. Adams St., Chicago 3, Ill.
Ajax Flexible Coupling Co., Westfield, N. Y.
Ajax Furnace Fitting Co., Div. of Cincinnati Sheet Metal & Roofing Co., 216-220 E. Front St., Cincinnati 2, O.
Akron Metallic Gasket Co., 155 N. Union, P. O. Box 911, Akron 9, O.
Akwa Heaters, Inc., 1955 Park Ave., New York 35, N. Y.
Alabama Pipe Co., Anniston, Ala.
Aladdin Heating Corp., 2222 San Pablo Ave., Oakland 12, Calif.
Albertson & Co., Inc., Sioux City 3, Ia.
Alco Valve Co., 861 Kingsland Ave., St. Louis 5, Mo.
●Aldrich Co., The, 105 Williams St., Wyoming, Ill.
Aldrich Pump Co., 4 Pine St., Allentown, Pa.
Alert Boiler & Mfg. Co., 315 W. Woodbridge St., Detroit 26, Mich.
Alexander Bros., 406 N. 3rd, Philadelphia, Pa.
Alfol Div., Reflectal Corp., 155 E. 44th St., New York 17, N. Y.
All-State Welding Alloys Co., Inc., White Plains, N. Y.
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh 22, Pa.
Allan Engineering Co., P. O. Box 1211, Dallas, Tex.
Allcraft Mfg. Co., 27 Hayward St., Cambridge, Mass.
●Allen-Bradley Co., 1335 S. First St., Milwaukee 4, Wis.
Allen Co., Inc., L. B., 6702 Bryn Mawr Ave., Chicago 31, Ill.
Allen Co., Robert G., P. O. Box 110, Mechanicsville, N. Y.
Allen Ventilator Div., Production Planning Co., 704 Woodward, Rochester, Mich.
Alliance Industries, Huntingden Valley, Pa.
Alliance Mfg. Co., Alliance, O.
Allied Control Co., Inc., 2 East End Ave., New York, N. Y.
Allied Weld-Craft, Inc., 401 W. South St., Indianapolis 4, Ind.
Allington & Curtis Mfg. Co., 1800 Holland Ave., Saginaw, Mich.
●Allis-Chalmers Mfg. Co., 1171 S. 70th St., Milwaukee 1, Wis.
Allis Co., Louis, The, 427 E. Stewart St., Milwaukee 7, Wis.
Alloy Steel Products Co., 1506 W. Elizabeth Ave., Linden, N. J.
Allpax Co., Inc., Mamaroneck, N. Y.
Alpha Metals, Inc., 363 Hudson Ave., Brooklyn 1, N. Y.
Alphil Spot Welding Co., 1058 Pacific St., Brooklyn, N. Y.
Alrose Chemical Co., Box 1294, Providence 1, R. I.
Alsoco Corp., 10 E. 52nd St., New York, N. Y.
Altens Foundry & Machine Works, Inc., 226 W. Wheeling St., Lancaster, O.
Alton Mfg. Co., 1112 Ross Ave., Dallas 2, Tex.
Alton Mineral Wool Insulation Co., 2317 Whittemore Pl., St. Louis 4, Mo.
Aluminum Co. of America, 801 Gulf Bldg., Pittsburgh 19, Pa.
Amercoat Div., American Pipe & Construction Co., 4809 Firestone Blvd., South Gate, Calif.
American Agile Corp., 5806 Hough Ave., Cleveland 3, O.
●American Air Filter Co., Inc., 373 Central Ave., Louisville 8, Ky.
●American Blower Corp., Detroit 32, Mich.
American Brass Co., 414 Meadow St., Waterbury 20, Conn.
American Car & Foundry Co., 30 Church St., New York 8, N. Y.
American Cast Iron Pipe Co., 2930 N. 16th St., Birmingham 2, Ala.
American Chemical Paint Co., Brookside Ave., Ambler, Pa.
American Cladmetals Co., P. O. Box 544, Carnegie, Pa.
American Coal Burner Co., 12-20 E. Erie St., Chicago 11, Ill.
American Coils Co., 360 Thomas St., Newark 5, N. J.
American Coolair Corp., 3604 Mayflower St., P. O. Box 2300, Jacksonville 3, Fla.
American Cooling Tower Co., 2710 McGee St., Kansas City 8, Mo.
American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, N. Y.
American Die & Tool Co., Inc., 3rd & Greenwich Sts., Reading, Pa.
●American District Steam Co., 25 Bryant St., North Tonawanda, N. Y.
American District Telegraph Co., 155 Sixth Ave., New York, N. Y.
American Engineering Co., Aramingo Ave. and Cumberland St., Philadelphia 25, Pa.
American Felt Co., Glenville, Conn.
American Flange & Mfg. Co., Inc., 30 Rockefeller Plaza, New York 20, N. Y.
American Flexible Coupling Co., 1801 Pittsburgh Ave., Erie, Pa.
American Foundry & Furnace Co., Washington St. at McClun, Bloomington, Ill.
American Furnace Co., 1300 Hampton Ave., St. Louis 10, Mo.
American Gas Accumulator Co., 1027 Newark Ave., Elizabeth 3, N. J.
American Hair & Felt Co., 1828 Merchandise Mart, Chicago 54, Ill.
American Hard Rubber Co., 11 Mercer St., New York 13, N. Y.
American Heat Corp., 491 Dutton St., Lowell, Mass.
American Hydrovac Inc., 290 Scholes St., Brooklyn 6, N. Y.
American Injector Co., 14544 Third Ave., Detroit 13, Mich.
American Instrument Co., Silver Spring, Md.
American K. A. T. Corp., Garwood, N. J.
American Ladder & Scaffold Co., 5705 N. W. 7th Ave., Miami 38, Fla.
American-Larson Ventilation Co., 1004 Keystone Bank Bldg., Pittsburgh 22, Pa.
American Locomotive Co., Alco Products Div., Dunkirk, N. Y.
American Locomotive Co., Diesel Engine Div., Auburn, N. Y.
American Machine Products Co., 401 S. Third Ave., Marshalltown, Ia.
American Machine Wks., Inc., Racine, Wis.
American Manganese Bronze Co., Rhawn & Hegerman Sts., Philadelphia, Pa.
American-Marietta Co., 43 E. Ohio St., Chicago 11, Ill.
American-Marsh Pumps, Inc., 60 Capital Ave., N. E., Battle Creek, Mich.
American Metal Hose Branch, American Brass Co., The, 698 S. Main St., Waterbury 20, Conn.
American Meter Co., Inc., 60 E. 42nd St., New York 17, N. Y.
American Moistening Co., 260 W. Exchange St., Providence, R. I.
American Nickeloid Co., 113 Second St., Peru, Ill.
American Photocopy Equipment Co., 2849 N. Clark St., Chicago 14.
American Pipe Bending Machine Co., Inc., 17 Furnace St., Poultney, Vt.
American Pipe Tool Co., 4856 W. Kinzie St., Chicago 44, Ill
American Pipe & Steel Corp., 2201 W. Commonwealth Ave., Alhambra, Calif.
American Pulley Co., The, 4200 Wissahickon Ave., Philadelphia 29.
●American Radiator & Standard Sanitary Corp., P. O. Box 1226, Pittsburgh 30, Pa.
American-Sand Banum Co., Inc., 9 Rockefeller Plaza, New York 20, N. Y.
American Screw Co., Willimantic, Conn.
American Sheet Metal Works, 331 N. Alexander, New Orleans, La.
American Shipbuilding Co., Ft. W. 54th St., Cleveland 2, O.
American Solder & Flux Co., 2152 E. Norris St., Philadelphia 25, Pa.
American Steel Band Co., P. O. Box 565, Pittsburgh, Pa.
American Steel & Wire Co., United States Steel Corp. Subsidiary, Rockefeller Bldg., Cleveland 13, O.
American Thermal Industries, Inc., 440 Illinois, Detroit 1, Mich.
American Ventilating Hose Co., 15 Park Row, New York 7, N. Y.

● Advertisement in this issue. See Index to Advertisers, page 127d

American Warming & Ventilating Co., 1017-1021 Summit St., Toledo 4, O.
American Water Softener Co., Lehigh Ave. and 4th St., Philadelphia 33, Pa.
American Welding & Mfg. Co., Griswold St., N. E., Warren, O.
American Well Wks., 100 N. Broadway, Aurora, Ill.
American Wheelabrator & Equipment Corp., 619 S. Byrkit St., Mishawaka, Ind.
American Zinc Products Div., Ball Brothers Co., Greencastle, Ind.
Ames, Chas. F., 140 E. 46th St., New York 17, N. Y.
●Ames Iron Works, Div. of Pierce Butler Radiator Corp., Oswego, N. Y.
Aminco Refrigeration Products Co., 14544 Third Ave., Detroit 3, Mich.
Ammco Tools, Inc., North Chicago, Ill.
Ammerman Co., C. L., 3719 3rd St., N. E., Minneapolis, Minn.
Amp Corp., 2921 Locust St., St. Louis, Mo.
Ampion Corp., 4-88 47th Ave., Long Island City 1, N. Y.
Anchor Packing Co., 401 N. Broad St., Philadelphia 8, Pa.
Andale Co., 1740 Cherry St., Philadelphia 3, Pa.
Andersen Corp., Bayport, Minn.
●Anderson Co., V. D., The, 1949 W. 96th St., Cleveland 2, O.
Anderson Diesel Engine Co., 6245 State Rd., Philadelphia 35, Pa.
Anderson Products, Inc., 17 Tudor St., Cambridge 39, Mass.
Anderson-Stolz Corp., 1731 Walnut St., Kansas City 8, Mo.
●Anemostat Corp. of America, 10 E. 39th St., New York 16, N. Y.
Anetsberger Bros., Inc., Northbrook, Ill.
Annis Air Filter Div., Royal Heaters, Inc., 1024 Westminster Ave., Alhambra, Calif.
Ansul Chemical Co., Refrigeration Div., Marinette, Wis.
Anti-Friction Bearings Co., 2020 S. Figueroa St., Los Angeles 7, Calif.
Apex All Weather Products, Engineering Div., 228 N. La Salle St., Chicago 1, Ill.
Apollo Steel Co., 609 Warren Ave., Apollo, Pa.
●Appleman Glass Works, Bergenfield, N. J.
Applied Mechanics Co., 167 Oliver St., Boston 10, Mass.
●April Showers Co., Inc., 4126 Eighth St., N. W., Washington 11, D. C.
Aqua Electric Scale Control, Inc., 2028 E. 22nd St., Cleveland 15, O.
Aqua-Mist Co., 426 Jefferson St., Topeka, Kans.
Aqua-Sorb Co., 21 S. 16th St., East Orange, N. J.
Aquatrol Laboratories, Inc., 233 Randolph Ave., Clifton, N. J.
Arabol Mfg. Co., 110 E. 42nd St., New York 17, N. Y.
Arco Co., The, 7301 Bessemer Ave., Cleveland 27, O.
Arcos Corp., 1500 S. 50th St., Philadelphia 43, Pa.
Arcweld Mfg. Co., Inc., 3469 Third Ave., W., Seattle 99, Wash.
Arens Controls, Inc., 2267 S. Halsted St., Chicago, Ill.
Arex Co., 4317 Ravenswood Ave., Chicago 13, Ill.
Arjac Products Inc., 55-59 Halstead St., Rochester 10, N. Y.
Armco Drainage & Metal Products, Inc., Welded Pipe Sales Div., Middletown, O.
Armco Steel Corp., 461 Curtis St., Middletown, Ohio.
Armour Ammonia Works, 1355 W. 31st St., Chicago, Ill.
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Rd., Chicago, Ill.
Armstrong Bros. Tool Co., 5200-5300 W. Armstrong Ave., Chicago 30, Ill.
Armstrong Co., The, 241 S. Post St., Detroit 17, Mich.
Armstrong Co., Richard M., Westchester, Pa.
●Armstrong Cork Co., 440 Concord St., Lancaster, Pa.
●Armstrong Machine Wks., 874 Maple St., Three Rivers, Mich.
Arrow-Hart & Hegeman Elect. Co., 103 Hawthorne St., Hartford 6, Conn.
Arrowhead Rubber Co., 11634 Patton Rd., Downey, Calif.
Art Valve Co., 4662 N. Lincoln Ave., Chicago 25, Ill.
Ashton Valve Co., 43 Kendrick St., Wrentham, Mass.
Askania Regulator Co., 240 E. Ontario St., Chicago 11, Ill.
Atkins & Co., E. C., 402 S. Illinois St., Indianapolis 9, Ind.
Atlantic Metal Hose Co., Inc., 123 W. 64th St., New York, N. Y.
Atlantic Pipebending & Fabricating Corp., 552 River Rd., Edgewater, N. J.
Atlantic Steel Boiler Co., 24th St. and Brown St., Philadelphia 30, Pa.
Atlantic Steel Co., P. O. Box 1714, Atlanta 1, Ga.
Atlas Chemical Co., Marietta, O.
●Atlas Mfg. Co., St. Paul, Minn.
Atlas Powder Co., Industrial Finishes, North Chicago, Ill.
Atlas Utilities Co., Inc., 17 Exchange St., Providence 3, R. I.
Atlas Valve Co., 282 South St., Newark, N. J.
Atlas Welding Accessories Co., 707 E. Lewiston Ave., Ferndale 20, Mich.
Auburn Burner Co., Lock Box 269, Auburn, Ind.
Auburn Foundry Inc., Stoker Div., Auburn, Ind.
●Auer Register Co., 6600 Clement Ave., Cleveland 5, O.
●Aurora Pump Co., 619 Loucks St., Aurora, Ill.
Austin-Mason Co., 6 Ashland St., Everett 49, Mass.
Autempco Corp., 521 Fifth Ave., New York 17, N. Y.
Autoforce Ventilating System, 244 Washington St., Boston 8, Mass.
Automatic Control Co., 1005 University Ave., St. Paul 4, Minn.
Automatic Devices Co., Inc., 53 W. Jackson Blvd., Chicago 4, Ill.
Automatic Electric Mfg. Co., 10 State St., Mankato, Minn.
Automatic Firing Corp., 6504 Olive Blvd., St. Louis 5, Mo.
Automatic Gas Equipment Co., 301 Brushton Ave., Pittsburgh 21, Pa.
●Automatic Switch Co., 391 Lakeside Ave., Orange, N. J.
Automatic Temperature Control Co., Inc., 5212 Pulaski Ave., Philadelphia 44, Pa.
●Autorad Inc., 3535 Fillmore St., Chicago 24, Ill.
Autostributor Co., 636 N. Magnolia, Lansing, Mich.
Azor Corp., 107 Montgomery Ave., Irvington, N. J.

B

B & M Mfg. Co., 14 N. Harrison St., East Orange, N. J.
B/W Controller Corp., 2200 E. Maple Ave., Birmingham, Mich.
Babbitt Chemical Specialties Co., 630 Fifth Ave., New York 20, N. Y.
Babbitt Steam Specialty Co., 1 Babbitt Sq., New Bedford, Mass.
●Babcock & Wilcox Co., 85 Liberty St., New York 6, N. Y.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Babcock & Wilcox Tube Co., The Welded Tube Div., Alliance, O.
Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh 8, Pa.
Bache & Co., Semon Greenwich & Morton Sts., New York 14, N. Y.
Badger Fire Extinguisher Co., 624 Somerville Ave., Somerville 43, Mass.
●Badger Mfg. Co., 260 Bent St., Cambridge 41, Mass.
Badham Insulation Co., Inc., Birmingham, Ala.
Baer Bros., 438 W. 37th St., New York 18, N. Y.
Bahnson Co., 1001 S. Marshall St., Winston-Salem, N. C.
Bailey Co., Chas. M., 667 Folsom St., San Francisco 7, Calif.
Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, O.
Baker & Co., Inc., 113 Astor St., Newark 5, N. J.
Baker Refrigeration Corp., South Windham, Me.
●Baldor Electric Co., 4353 Duncan Ave., St. Louis 10, Mo.
Baldwin Belting, Inc., 74-76 Murray St., New York 7, N. Y.
Baldwin-Hill Co., 596 Breunig Ave., Trenton 2, N. J.
Baldwin Locomotive Works, Philadelphia 42, Pa.
Ball Welding Works, Inc., 10154 Edes Ave., Oakland 3, Calif.
Balloffet Dies and Nozzle Co., Inc., 6825 Adams St., Guttenberg, N. J.
●Baltimore Aircoil Co., Inc., 715-17 W. Pratt St., Baltimore 1, Md.
Baltimore Porcelain Steel Corp., P.O. Box 928, Baltimore 3, Md.
Bar-Brook Mfg. Co., Inc., 6133 Linwood Ave., Shreveport, La.
Barber-Colman Co., 1228 Rock St., Rockford, Ill.
Barber Gas Burner Co., 3704 Superior Ave., Cleveland 14, O.
Barclay, Inc., Robert, 128 N. Peoria St., Chicago, Ill.
Barco Mfg. Co., 1801 Winnemac Ave., Chicago 40, Ill.
Bard Mfg. Co., Bryan, O.
Barksdale Valves, 4905 Santa Fe Ave., Los Angeles 58, Calif.
Barnes Co., A. D., 4731 Wilmington Pike, Dayton 9, O.
●Barnes & Jones, Inc., 128 Brookside Ave., Jamaica Plain, Boston 30, Mass.
Barnes Manufacturing Co., Mansfield, O.
Barnes Tool Co., The, 152 Brewery St., New Haven 6, Conn.
Barrett Div., The, Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Barrett, Haentjens & Co., Hazleton, Pa.
Barrett Machine Co., 912-916 Behan St., N. S., Pittsburgh 12, Pa.
Bart Mfg. Co., Inc., 227 Main St., Belleville 9, N. J.
Barth Mfg. Co., Milldale, Conn.
Bartlett Hayward, Div. of Koppers Co., 200 Scott St., Baltimore, Md.
Bartlett Mfg. Co., 3003 E. Grand Blvd., Detroit 2, Mich.
Barton Co., 719 Hennepin, Minneapolis, Minn.
Barton Instrument Corp., 1429 S. Eastern Ave., Los Angeles 22, Calif.
Barwick Mfg. Corp., 317 E. 18th, Wichita, Kan.
Baseline Mfg. Corp., 4022 N. Washington Ave., Minneapolis 12, Minn.
Basic Refractories, Inc., 845 Hanna Bldg., Cleveland 15, O.
Bastian-Morley Co., Inc., LaPorte, Ind.
Bath Co., Cyril, The, E. 70th and Machinery Ave., Cleveland 3, O.
Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N. Y.
Bayer Co., 4030 Chouteau Ave., St. Louis 10, Mo.
Bayley Blower Co., 1817 S. 66th St., Milwaukee 14, Wis.
Beach-Russ Co., 64A Church St., New York, N. Y.
Beacon-Morris Corp., 60 Brainerd Rd., Allston, Boston 34, Mass.
Bear Mfg. Co., Industrial Div., Rock Island, Ill.
Bearings Co. of America, 501 Harrisburg Ave., Lancaster, Pa.
Bearlee Products Co., 1255 S. Monroe, Green Bay, Wis.
Beaton & Cadwell Mfg. Co., 185 Main St., New Britain, Conn.
Beaton & Corbin Mfg. Co., Southington, Conn.
Beaver Art Metal Corp., Ellwood City, Pa.
Beaver Pipe Tools, Inc., 310 Dana Ave., Warren, O.
Beck Engineering Combustion Kompany, 2100 Cole St., St. Louis 6, Mo.
Beckett & Co., Inc., Thomas, 2001 Willowbrook Rd., P. O. Box 7354, Dallas 9, Tex.
Beckley Perforating Co., 301 North Ave., Garwood, N. J.
Belfield Valve Div. of Minneapolis-Honeywell Regulator Co., 435 N. Broad St., Philadelphia 23, Pa.
Belknap Mfg. Co., 800 Union Ave., Bridgeport 1, Conn.
●Bell & Gossett Co., Morton Grove, Ill.
Bellows Co., 222 W. Market St., Akron 9, O.
Belmont Packing & Rubber Co., The, Butler & Sepviva Sts., Philadelphia 37, Pa.
Belmont Smelting & Refining Wks., Inc., 349 Belmont Ave., Brooklyn 7, N. Y.
Belter Electric Mfg. Co., G. J., The, 3830-32 Olive St., St. Louis 8, Mo.
Bendix Aviation Corp., Eclipse-Pioneer Div., Metal Hose Dept., Teterboro, N. J.
Benjamin Air Rifle Co., 1527 S. 8th St., St. Louis 4, Mo.
Benjamin Electric Mfg. Co., Des Plaines, Ill.
Bennett Oil Co., 964 S. Saddle Creek Rd., Omaha 6, Neb.
Benson Co., Inc., Alex R., 1040 Bay Rd., So., Hudson, N. Y.
Berger Bros. Co., 229-237 Arch St., Philadelphia 6, Pa.
Berger Mfg. Div., Republic Steel Corp., 1038 Belden Ave., Canton 5, O.
Bern's Mfg. Co., 2278 N. Elston Ave., Chicago, Ill.
Bernz Co., Otto, 280 Lyell Ave., Rochester 6, N. Y.
Bertsch & Co., Inc., Church St., Cambridge City, Ind.

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●Best Combustion Equipment Co., Inc., W. N., 415 11th St., Carlstadt, N. J.
Best Register Co., 2005 W. Oklahoma Ave., Milwaukee 15, Wis.
Bete Fog Nozzle Inc., 85 Pierce St., Greenfield, Mass.
Bethlehem Steel Co., Bethlehem, Pa.
Betz Corp., 460 State St., Hammond, Ind.
Beverly Shear Mfg. Co., 3013 W. 110th Pl., Chicago 43, Ill.
Biersach & Niedermeyer Co., 1937 N. Hubbard St., Milwaukee 12.
Bigelow Co., 174 River St., New Haven 3, Conn.
Bigelow Liptak Corp., 2842 W. Grand Blvd., Detroit 2, Mich.
Biggs Boiler Wks. Co., The, 1007 Bank St., E. Akron 5, O.
Bignall & Keeler Div., John Ramming Machine Co., 4591 McRee Ave., St. Louis 10, Mo.
Billings & Spencer Co., 1 Laurel St., Hartford 1, Conn.
●Binks Mfg. Co., 3114-40 Carroll Ave., Chicago 12, Ill.
Birchfield Boiler, Inc., 2503 E. 11th St., Tacoma 1, Wash.
Bird-Archer Co., 4337 North American St., Philadelphia 40, Pa.
Birdsell Mfg. Co., Inc., 871 San Antonio Rd., Mountain View, Calif.
●Bishop & Babcock Mfg. Co., 4901 Hamilton Ave., Cleveland 14, O.
Black & Decker Mfg. Co., 628 Pennsylvania Ave., Towson 4, Md.
Black Magic Products Co., P. O. Box 1703, Tulsa, Okla.
Black Mfg. Co., The, 1426 W. Baltimore St., Baltimore 23, Md.
Black-Sivalls & Bryson, Inc., 7501 E. 10th St., Kansas City 3, Mo.
Blackhawk Mfg. Co., 5325 W. Rogers St., Milwaukee 1, Wis.
Blackmer Pump Co., 1920A Century Ave., S. W., Grand Rapids 9.
Blaisdell Compressor Co., 227 Fulton St., New York, N. Y.
Blazer, M., & Son, 173 Market St., Passaic, N. J.
Bliss Co., E. W., 1375 Raff Rd., S. W., Canton, O.
Blokolgas System, Inc., 70 W. Alexandrine, Detroit 1, Mich.
Blood Brothers Machine Co., Div. of Standard Steel Spring Co., Allegan, Mich.
Blower Application Co., 3165 N. 30th St., Milwaukee 16, Wis.
Blue Ridge Talc Co., Inc., Henry, Va.
Blue Seal Chemical Co., 177 Westfield Ave., W., Roselle Park, N. J.
Bodine Electric Co., 2254 W. Ohio St., Chicago 12, Ill.
Bogue Electric Co., 37 Kentucky Ave., Paterson 3, N. J.
Bohn Aluminum & Brass Corp., 2306 Franklin St., Detroit, Mich.
Bonafide Genasco, Inc., 295 Fifth Ave., New York 16, N. Y.
Bonney Forge & Tool Wks., 350 Green St., Allentown, Pa.
Bordo Co., Inc., L. J., 115 New St., Glenside, Pa.
Borg-Erickson Corp., 469 E. Ohio St., Chicago 11, Ill.
Borm Mfg. Co., 23 N. Union St., Elgin, Ill.
Boston Auto Gage Co., 70 West St., Pittsfield, Mass.
Boston Gear Works, Inc., North Quincy, Mass.
Boston Woven Hose & Rubber Co., 29 Hampshire St., Cambridge, Mass.
Botfield Refractories Co., Swanson & Clymer Sts., Philadelphia 47, Pa.
Bowen Engineering, Inc., North Branch, N. J.
Bowerston Shale Co., Bowerston, O.
Bowser, Inc., 1302 E. Creighton Ave., Fort Wayne 2, Ind.
Boylston Steam Specialty Co., 116-122 W. Illinois St., Chicago, Ill.
Brabender Corp., Rochelle Park, N. J.
Bradfield, Jos. L., 10 N. Senate Ave., Indianapolis, Ind.
Brady Co., W. H., 808 N. Third St., Milwaukee 3, Wis.
Breidert Co., G. C., 3129 San Fernando Rd., Los Angeles 65, Calif.
Bremil Mfg. Co., 1204 Pittsburgh Ave., Erie, Pa.
Bridgeport Brass Co., 30 Grand St., Bridgeport 2, Conn.
Bridgeport Thermostat Div., Robertshaw-Fulton Controls Co., Connecticut Ave., Bridgeport 1, Conn.
Bristol Co., The, P. O. Box 1790, Waterbury 20, Conn.
Broan Mfg. Co., Inc., 1669 N. Water St., Milwaukee 2, Wis.
Brockway Co., 361 Church St., Naugatuck, Conn.
Bronson Fan Mfg. Co., 1237 Riverside Dr., Los Angeles 31, Calif.
Brooke Engineering Co., Inc., 4517 Wayne Ave., Philadelphia 44, Pa.
Brookfield Engineering Laboratories, Inc., 2 Porter St., Stoughton, Mass.
Brooklyn Varnish Mfg. Co., 50 Jay St., Brooklyn 1, N. Y.
Brooks Equipment Corp., 217 Hudson St., Hoboken, N. J.
Bros Boiler & Mfg. Co., Wm., 1057 10th Ave., S. E., Minneapolis 14.
Brown-Brockmeyer Co., Inc., P. O. Box 976, Dayton 1, O.
Brown Co., 500 Fifth Ave., New York, N. Y.
Brown-Electro Co., 17 N. Dewey, Oklahoma City 2, Okla.
Brown Fintube Co., The, Elyria, O.
●Brown Products Co., 97-12 Metropolitan Ave., Forest Hills, N. Y.
Brownell Co., 408 N. Findlay St., Dayton 1, O.
Browning Mfg. Co., Inc., 1940 Browning Blvd., Maysville, Ky.
Brundage Co., The, 503 N. Park St., Kalamazoo 11, Mich.
Bruning Co., Inc., Charles, 4754 Montrose Ave., Chicago 41, Ill.
●Brunner Mfg. Co., 1821 Broad St., Utica 1, N. Y.
Bryan Steam Corp., P. O. Box 337, Peru, Ind.
Bryant Corp., C. L., 4610 St. Clair Ave., Cleveland 3, O.
●Bryant Heater Div., Affiliated Gas Equipment Co., Inc., 17825 St. Clair Ave., Cleveland 10, O.
Bubar, Dust Systems, Inc., Old Lyme, Conn.
Buckeye Tools Corp., 29 W. Apple St., Dayton 1, O.
Buda Co., Harvey, Ill.
Buensod-Stacey, Inc., 60 E. 42nd St., New York 17, N. Y.
Buffalo Bolt Co., North Tonawanda, N. Y.
●Buffalo Forge Co., 171 Mortimer St., Buffalo 5, N. Y.
Buffalo Meter Co., 2917 Main St., Buffalo 14, N. Y.
●Buffalo Pumps, Inc., 171 Mortimer St., Buffalo 5, N. Y.
Buffalo Tank Corp., 744 Broad St., Newark 2, N. J.
Buflovac Equipment Div. of Blaw-Knox Co., 50 Winchester Ave., Buffalo 11, N. Y.
Builders-Providence, Inc., Div. of Builders Iron Foundry, 345 Harris Ave., Providence 1, R. I.
Bump Pump Co., La Crosse, Wis.
●Bundy Tubing Co., 8109 E. Jefferson Ave., Detroit 14, Mich.
Burden Co., Alan E., 6525 Sunset Blvd., Hollywood 28, Calif.
Burke Electric Co., Div. of Marathon Electric Mfg. Corp., 1901 W. 12th St., Erie, Pa.
Burling Instrument Co., Air Conditioning Div., 253 Springfield Ave., Newark 3, N. J.
Burnham Corp., Boiler Div., Main St., Irvington, N. Y.
Burnley Battery & Mfg. Co., 103 Clay St., North East, Pa.
Burrows Mfg. Co., F. A., 318 E. Poplar St., York, Pa.
Burt Mfg. Co., 41 E. South St., Akron 11, O.
Bury Compressor Co., 18th & Cascade Sts., Erie, Pa.
●Bush Mfg. Co., 179 South St., West Hartford, Conn.
Byers Co., A. M., Clark Bldg., Pittsburgh 22, Pa.

C

CCA Products, Inc., P. O. Box 671, Glendale 5, Calif.
C & H Air Conditioning Fan Co., Inc., 1603 DeKalb Ave., N. E., Atlanta 6, Ga.
Cabot, Inc., Samuel, 141 Milk St., Boston 9, Mass.
Calbar Paint & Varnish Co., 2612-26 N. Martha St., Philadelphia 25.
●Calculator Specialties Co., 122 S. Michigan Ave., Chicago 3, Ill.
Caldwell Co., W. E., 2120 Brook St., Louisville, Ky.
Calgon, Inc., Hagan Bldg., Pittsburgh 30, Pa.
California Brass Mfg. Co., 1447 Naud St., Los Angeles 12, Calif.
Callahan Can Machine Co., Inc., 80 Richard St., Brooklyn, N. Y.
Caloroil Burner Corp., 850 Windsor St., Hartford 5, Conn.
Camco Products Inc., 25 Fox St., New Haven 13, Conn.
Camloc Fastener Corp., 420 Lexington Ave., New York 17, N. Y.
Campbell Co., J. A., 645 E. Wardlaw Rd., Long Beach 7, Calif.
Campbell Engineering Co., 918 N. Union St., Appleton, Wis.
●Campbell Heating Co., 31st & Dean, P. O. Box 833, Des Moines 4, Ia.
Campbell Heating Co., E. K., 1809 Manchester, Kansas City 3, Mo.
Cam-Stat, Inc., Div. of The Paul Henry Co., 2310 S. LaCienega Blvd., Los Angeles 34, Calif.
Canatsey Electric Mfg. Co., Box 556, Kansas City 8, Mo.
Cannelton Sewer Pipe Co., RadianTile Div., 120 S. LaSalle St., Chicago 3, Ill.
Cannon Chemical Co., Inc., 181 Portland St., Cambridge 41, Mass.
Canton Stoker Corp., 407 Andrew Place, S. W., Canton 1, O.
Canvas Products Co., 1236 S. 7th St., St. Louis 4, Mo.
Capewell Mfg. Co., Hartford 2, Conn.
Capitol Mfg. & Supply Co., 153 W. Fulton St., Columbus, O.
Carbide and Carbon Chemicals Div., Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Cardox Corp., 307 N. Michigan Ave., Chicago, Ill.
Carey Electronic Engineering Co., Metal Wool Div., 1880 Clifton Ave., Springfield, O.
Carey Mfg. Co., Philip, Wayne Ave., Lockland, Cincinnati 15, O.
Cargocaire Engineering Corp., 15 Park Row, New York 7, N. Y.
Carling Turbine Blower Co., 25 St. John's Rd., Worcester 3, Mass.
Carlson & Sullivan, 1714 California St., Monrovia, Calif.
Carnes, Inc., John R., Greenlawn Ave. & Erie R. R., Lima, O.
Carney Co., Inc., The, Mankato, Minn.
Carolina Aniline & Extract Co., 301 S. Cedar St., Charlotte, N. C.
Carolina Blower Co., Inc., 430 Morehead Ave., Greensboro, N. C.
Carpenter Heating & Stoker Co., 2135 St. Clair Ave., Cleveland 14, O.
Carpenter Mfg. Corp., The, 9523 Detroit Ave., Cleveland 2, O.
Carpenter & Paterson, Inc., 1190 Bennington St., East Boston 2, Mass.
Carpenter Steel Co., Alloy Tube Div., Union, N. J.
Carrier Corp., 302 S. Geddes St., Syracuse 1, N. Y.
Carty & Moore Engineering Co., 1150 W. Baltimore Ave., Detroit 26, Mich.
Carver Pump Co., Muscatine, Ia.
Case & Son Mfg. Co., W. A., 33 Main St., Buffalo 3, N. Y.
●Cash Co., A. W., P. O. Box 551, Decatur, Ill.
Cash Valve Mfg. Co., A. W., 6621 E. Wabash Ave., Decatur 80, Ill.
Cashin Co., W. D., 69 A. St., Boston 27, Mass.
Catawissa Valve & Fittings Co., Catawissa, Pa.
Caterpillar Tractor Co., Peoria 8, Ill.
Catskill Metal Works, Inc., Catskill, N. Y.
Celco Corp., 110 E. 42nd St., New York 17, N. Y.
Celotex Corp., The, 120 S. La Salle Bldg., Chicago 3, Ill.
Cement Lined Pipe Co., 93 Brookline St., Lynn, Mass.
Central Brass Mfg. Co., 2950 E. 55th St., Cleveland 4, O.
Central Die Casting & Mfg. Co., Inc., 2935 W. 47th St., Chicago, Ill.
Central Foundry Co., 386 Fourth Ave., New York 16, N. Y.
Central Rubber & Steel Corp., P. O. Box 420, Findlay, O.
Central States Mfg. Co., Inc., 1200-12 Summit St., Arkansas City, Kan.
Central States Steel Boiler Co., 4649 W. Harrison St., Chicago 44, Ill.
Central Station Steam Co., 2920 E. Woodbridge St., Detroit 7, Mich.
Central Wire & Iron Works, 621 E. Locust St., Des Moines, Ia.
Centrifix Corp., 3029 Prospect Ave., Cleveland 15, O.
Centri-Spray Corp., 14290 Meyers Rd., Detroit 27, Mich.
Century Aircraft Co., 5607 W. Century Blvd., Los Angeles 45, Calif.
●Century Electric Co., 1806 Pine St., St. Louis 3, Mo.
Century Engineering Corp., 401-431 3rd St., S. E., Cedar Rapids, Ia.
Century Fan & Ventilator Co., 41 Cedar St., Stamford, Conn.
Certain-teed Products Corp., 120 E. Lancaster Ave., Ardmore, Pa.
Certified Flexible Couplings, 369 Lexington Ave., New York 17, N. Y.
Certified Furnace Co., Div. Stainless & Steel Products Co., 1000 Berry Ave., St. Paul 4, Minn.
Chace Co., W. M., 1606 Beard Ave., Detroit 9, Mich.
Chain Belt Co., 1617 W. Bruce, Milwaukee 4, Wis.
Chamberlin Co. of America, 1254 La Brosse St., Detroit 32, Mich.
Champion Blower & Forge Co., Harrisburg Ave. and Charlotte St., Lancaster, Pa.
Champion Furnace Pipe Co., 215 Eaton St., Peoria 3, Ill.

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Champion Laboratories, Inc., Meriden, Conn.
Champion Machine & Forging Co., 3695 E. 78th St., Cleveland 5, O.
Chandler Co., 804 First Ave., N. W., Cedar Rapids, Ia.
Chaplin-Fulton Mfg. Co., 5800 Grand Ave., Pittsburgh 25, Pa.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
Char-Gale Mfg. Co., 4325 Hiawatha Ave., Minneapolis 6, Minn.
Chase Brass & Copper Co., 236 Grand St., Waterbury 20, Conn.
Chase-Shawmut Co., Newburyport, Mass.
Chelsea Fan & Blower Co., Inc., 639 South Ave., Plainfield, N. J.
Chelsea Metal Stamping Co., 95 8th Ave., New York 11, N. Y.
Chemical Engineering Co., 2800 Logan St., P. O. Box 1076, Dallas 1, Tex.
Chemical Solvent Co., 3005 N. 16th St., Birmingham, Ala.
Cheney Flashing Co., 623 Prospect St., Trenton 5, N. J.
Chicago Belting Co., 113-125 N. Green St., Chicago 7, Ill.
Chicago Blower Corp., 4558 W. Congress St., Chicago 24, Ill.
Chicago Bridge & Iron Co., 332 S. Michigan Ave., Chicago 4, Ill.
Chicago Die Casting Mfg. Co., 2510-14 W. Monroe St., Chicago 12, Ill.
Chicago Expansion Bolt Co., 1338 W. Concord Pl., Chicago 22, Ill.
Chicago Fan & Fin Coil Co., 1937 Walnut St., Chicago 12, Ill.
Chicago Filter Co., Joliet, Ill.
Chicago Fire Brick Co., 1467 N. Elston Ave., Chicago 22, Ill.
Chicago Float Works, Inc., Dept. T., 2330 S. Western Ave., Chicago 8, Ill.
Chicago Furnace Supply Co., 1278 Clybourn Ave., Chicago, Ill.
Chicago Metal Hose Corp., 1315 S. Third Ave., Maywood, Ill.
Chicago Metal Mfg. Co., 3724 S. Rockwell St., Chicago 32, Ill.
Chicago Nipple Mfg. Co., 1616 S. Laramie Ave., Cicero 50, Ill.
Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.
●Chicago Pump Co., 2300 Wolfram St., Chicago 18, Ill.
Chicago Specialty Mfg. Co., 2954 Lawrence Ave., Chicago 25, Ill.
Chicago Steel Furnace Co., 9326 S. Anthony Ave., Chicago 17, Ill.
Chicago Steel Tank Co., 6400 W. 66th, Chicago 38, Ill.
Chicago-Wilcox Mfg. Co., E. 77th St. and Anthony Ave., Chicago, Ill.
Chiksan Co., Brea, Calif.
Childers Mfg. Co., 625 Yale St., Houston, Tex.
Chrysler Airtemp, Div. of Chrysler Corp., 1600 Webster St., Dayton 1, O.
Cincinnati Electrical Tool Co., The, 2684 Madison Rd., Cincinnati 8, O.
Cincinnati Metalcrafts Inc., 5000 Brotherton Rd., Cincinnati 9, O.
Cincinnati Shaper Co., Hopple, Garrard and Elam, Cincinnati 25, O.
Cinder Products Corp., 75 Ellenfield St., Providence, R. I.
Circulators & Devices Mfg. Corp., 128-168 Thirty-Second St., Brooklyn 32, N. Y.
Cissell Mfg. Co., Inc., W. M., 831 S. First St., P. O. Box 1143, Louisville 1, Ky.
Clapp Instrument Co., Tracy Court, Webster, Mass.
●Clarage Fan Co., Porter St., Kalamazoo 16, Mich.
Clark Bros. Bolt Co., Milldale, Conn.
Clark Controller Co., 1146 E. 152nd St., Cleveland 10, O.
Clark Dust Control Co., 210 N. Mozart St., Chicago, Ill.
Clark Electric Co., Jas., Jr., 615 Bergman St., Louisville 3, Ky.
Clark Mfg. Co., 1830 E. 38th St., Cleveland 14, O.
Claronex Products, Inc., 239 Java St., Brooklyn, N. Y.
Cla-Val Co., P. O. Box 949, Alhambra, Calif.
Clay Equipment Corp., Cedar Falls, Ia.
Clayton & Lambert Mfg. Co., 1701 Dixie Hwy., Louisville 10, Ky.
●Cleaver-Brooks Co., 326 E. Keefe Ave., Milwaukee 12, Wis.
Cleveland Brass Mfg. Co., The, 4606 Hamilton Ave., Cleveland, O.
●Cleveland Fuel Equipment Co., 7316 Associate Ave., Cleveland 9, O.
Cleveland Graphite Bronze Co., 17000 St. Clair Ave., Cleveland 10, O.
Cleveland Humidifier Co., 7802 Wade Park Ave., Cleveland 3, O.
Cleveland Punch & Shear Works Co., E. 40th and St. Clair Ave.. Cleveland 14, O.
Cleveland Tramrail Div., Cleveland Crane & Eng. Co., 5866 E. 289th St., Wickliffe, O.
Clifford Mfg. Co., Div. of Standard-Thomson Corp., 152 Grove St., Waltham 54, Mass.
Climax Machinery Co., 301 S. LaSalle St., Indianapolis, Ind.
Clinton Metallic Paint Co., P. O. Box 278, Clinton, N. Y.
Clizbe Bros. Mfg. Co., Plymouth, Ind.
Clow & Sons, James B., 201-299 N. Talman Ave., Chicago 12, Ill.
Cobra Pipe & Coil Co., Inc., Brook St., P. O. Box 176, Elmwood 10, Conn.
Cochrane Corp., 3131 N. 17th St., Philadelphia 32, Pa.
Coe Mfg. Co., Bank St., Painesville, O.
Coffin Co., J. S., Jr., 326 S. Dean St., Englewood, N. J.
Cole-Sewell Engineering Co., 2288 University Ave., St. Paul 4, Minn.
Colebrook & Sons, Inc., W. H. 246 Walton St., Syracuse, N. Y.
Coleman-Pettersen Corp., 2130 St. Clair Ave., Cleveland 14, O.
Colonial Alloys Co., Metals Div., Ridge Ave. and Crawford St., Philadelphia 29, Pa.
Columbia Engineering Service Co., 173 14th St., San Francisco 3, Calif.
Columbia Radiator Co., 3400 Walnut St., McKeesport, Pa.
Columbia Steel Co. (Sub. United States Steel Corp.), Russ Bldg., 235 Montgomery St., San Francisco 6, Calif.
Columbian Steel Tank Co., 1509 W. 12th St., Kansas City 7, Mo.
Columbus Heating & Ventilating Co., 182 N. Yale Ave., Columbus 16, O.
Columbus Steam Pump Wks. Co., 724 W. Gay St., Columbus 8, O.
●Combustion Control Corp., 77 Broadway, Cambridge 42, Mass.
Combustion Engineering-Superheater, Inc., 200 Madison Ave., New York 16, N. Y.
Comfort Products Corp., 2220 Lamesa, Dallas 2, Tex.
Commercial Filters Corp., 18 W. Third, Boston 27, Mass.
Commercial Plastics Co., 1198 Merchandise Mart, Chicago 54, Ill.
Commercial Shearing & Stamping Co., 1775 Logan, P. O. Box 719, Youngstown 1, O.
Commercialaire, Inc., 300 Pacific St., Brooklyn 2, N. Y.
Commonwealth Brass Corp., 5781-5835 Commonwealth Ave., Detroit 8, Mich.
Conco Engineering Works, Div. of H. D. Conkey & Co., Mendota, Ill.
Condensation Engineering Corp., 3511 W. Potomac Ave., Chicago 51, Ill.
●Condenser Service & Engineering Co., Inc., 95 River St., Hoboken, N. J.
Conditionaire Unit Co., 2821 Montrose Ave., Chicago 18, Ill.
Congress Drives Div., Tann Corp., 3750 E. Outer Drive, Detroit 34, Mich.
Congress Fan & Electric Co., P. O. Box 3747, Peninsula Sta., Daytona Beach, Fla.
Conneaut Plastic Metallic Packing Co., Conneaut, O.
Connery Construction Co., 2nd and Luzerne Sts., Philadelphia 40, Pa.
●Connor Engineering Corp., W. B., Danbury, Conn.
Conoflow Corp., Dept. P, 2100 Arch St., Philadelphia 3, Pa.
Consolidated Boiler Corp., 126 Dartmouth St., Boston 16, Mass.
Consolidated Car-Heating Co., Inc., Albany, N. Y.
●Continental Air Filters, Inc., 2520 Helm St., Louisville 1, Ky.
Continental-Diamond Fibre Co., Newark, Del.
Continental Electric Co., Inc., 323 Ferry St., Newark, N. J.
Continental Machine Co., 1952-54 Maud Ave., Chicago 14, Ill.
Continental Motors Corp., Muskegon 82, Mich.
Continental Products Co., 1150 E. 222nd St., Euclid 17, O.
Continental Radiant Glass Heat Corp., 521 Fifth Ave., New York 17, N. Y.
Continental Rubber Wks., 2000 Liberty St., Erie, Pa.
Continental Screw Co., Mt. Pleasant St., New Bedford, Mass.
Continental Steel Corp., 1108 S. Main St., Kokomo, Ind.
Controlair Mfg. Co., 1932 S. Compton Ave., Los Angeles, Calif.
Cook, Inc., A. D., Lawrenceburg, Ind.
Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill.
Cooper Alloy Foundry Co., The, Bloy St. & Ramsey Ave., Hillside, N. J.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Cooper Co., Clark, Palmyra, N. J.
Copeland Refrigeration Corp., Sidney, O.
Coppus Engineering Corp., 344 Park Ave., Worcester 2, Mass.
Coral Designs, 12-16 Astoria Blvd., Long Island City 2, N. Y.
Corbman Bros., Inc., 315 N. 7th St., Philadelphia 6, Pa.
Cordo Chemical Co., 34 Smith St., Norwalk, Conn.
Cork Import Corp., 1 Engle St., Englewood, N. J.
Cork Insulation Co., Inc., 155 E. 44th St., New York, N. Y.
Corley Co., Inc., The, One Exchange Place, Jersey City 2, N. J.
Corning Glass Works, Corning, N. Y.
Coroaire Heater Corp., The, 1124 Hanna Bldg., Cleveland 15, O.
●C-O Two Fire Equipment Co., Newark, N. J.
Coughlan Co., G. N., West Orange, N. J.
Couplings Co., 55 E. 18th St., Chicago 16, Ill.
Crabb Engineering Co., 13594 Wisconsin Ave., Detroit 4, Mich.
●Crane Co., 836 S. Michigan Ave., Chicago 5, Ill.
Crane Packing Co., 1872 Cuyler Ave., Chicago 13, Ill.
CraneVeyor Corp., 1240 S. Boyle Ave., Los Angeles 23, Calif.
Crawford Co., 3220 W. 31st St., Chicago 23, Ill.
Crescent Tool Co., 230 Harrison St., Jamestown, N. Y.
Crittall Radiant Heating, Inc., Richard, 665 Fifth Ave., New York 22, N. Y.
●Crocker-Wheeler Div. Elliott Co., Ampere 14, N. J.
Croll-Reynolds Engineering Co., Inc., 17 Johns St., New York 7, N. Y.
Croll & Son, Jesse G., 2326-2606 Germantown Ave., Philadelphia, Pa.
Crosby Steam Gage & Valve Co., 43 Kendrick St., Wrentham, Mass.
Crotty Mfg. Corp., 133-15 35th Ave., Flushing, L. I., N. Y.
Crowell & Dunn, Inc., 225 Lafayette St., New York, N. Y.
Crown Controls Co., Inc., 124 S. Washington St., New Bremen, O.
Crown Die & Tool Co., 108 N. Jefferson St., Chicago 6, Ill.
Crown Iron Works Co., 1202 N. E. Tyler, Minneapolis, Minn.
Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y.
Cryer Trap & Valve Co., Inc., 366 Madison Ave., New York 17.
Cuno Engineering Corp., 80 S. Vine St., Meriden, Conn.
Curtis Automotive Devices, Inc., 8 Norwood Ave., Dayton 7, O.
●Curtis Refrigerating Machine Div., Curtis Mfg. Co., 1950 Kienlen Ave., St. Louis 20, Mo.
Custom Engineering Co., 3138 W. Slauson Ave., Los Angeles 43, Calif.
Cutler-Hammer, Inc., 315 N. 12th St., Milwaukee 1, Wis.
Cyclotherm Corp., 157 E. First St., Oswego, N. Y.

D

Daffin Mfg. Co., Lancaster, Pa.
Dahlquist Mfg. Co., Inc., Div. of Process Engineering Inc., 628 Somerville Ave., Somerville 43, Mass.
Dahlstrom Machine Works, 4970 N. Elston Ave., Chicago 30, Ill.
Daigger & Co., A., 161 W. Kinzie St., Chicago, Ill.
Dalmo-Victor Co., San Carlos, Calif.
Daly, Merritt & Sullivan, Inc., West Broad St., Falls Church, Va.
Dalzen Tool & Mfg. Co., 13650 E. Ten Mile Rd., Detroit 5, Mich.
Dampney Co. of America, 1243 River St., Hyde Park, Boston 36, Mass.
Dana Fan & Blower Corp., 3501-27 Colerain Ave., Cincinnati 23, Ohio.
Danzer Metal Works Co., Box 201, Hagerstown, Md.
Darcoid Co., Inc., 145 Sixth Ave., New York 13, N. Y.
Darling Valve & Mfg. Co., 701 First St., Williamsport, Pa.
Dart Mfg. Co., E. M., 134 Thurbers Ave., Providence 5, R. I.
DAS Div. of, Defiance Automatic Screw Co., Defiance, O.
Davey Compressor Co., Kent, O.
Davidson Co., M. T., 43-53 Keap St., Brooklyn 11, N. Y.
Davidson Hy Duty Roof Fan Co., 213 California St., Newton, Mass.
Davies & Co., Wayne, Westboro, Mass.
Davis & Co., Dean W., 1006 First St., Kentland, Ind.

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●Davis Engineering Corp., 1070 E. Grand St., Elizabeth 4, N. J.
Davis Instruments, Div. of Davis Emergency Equipment Co., Inc., 201 Halleck St., Newark 4, N. J.
Davis Regulator Co., 2546 S. Washtenaw Ave., Chicago 8, Ill.
Day & Night Div., Affiliated Gas Equipment, Inc., 700 Royal Oaks Dr., Monrovia, Calif.
Day Co., The, 810-830 Third Ave., N. E., Minneapolis 13, Minn.
Dayton Air Compressor Co., The, 427 Valley St., Dayton 4, O.
Dayton Rubber Co., 2342 W. Riverview Ave., Dayton 1, O.
Dean Brothers Pumps, Inc., 323 W. 10th St., Indianapolis 7, Ind.
Dean Hill Pump Co., 4000 E. 16th St., Indianapolis 7, Ind.
Dearborn Chemical Co., 310 S. Michigan Ave., Chicago 4, Ill.
Dearborn Stove Co., 1700 W. Commerce St., Dallas, Tex.
Debevoise Co., The, 74-84 20th St., Brooklyn 32, N. Y.
●DeBothezat Fans Div., American Machine & Metals, Inc., East Moline, Ill.
Decatur Iron & Steel Co., P. O. Box 72, Decatur, Ala.
Decatur Pump Co., 2750 Nelson Park Dr., Decatur 70, Ill.
Deepfreeze Distributing Corp., 3928 Reading Rd., Cincinnati 9, O.
Defender Instrument & Regulator Co., 815 Clark Ave., St. Louis 2, Mo.
Diesel Oil Burner Corp. of New York, 105-20 New York Blvd., Jamaica, Long Island, N. Y.
De Laval Steam Turbine Co., Trenton 2, N. J.
●Delavan Mfg. Co., 3007-Sixth Ave., Des Moines 13, Ia.
Delco Appliance Div., General Motors Corp., P. O. Box 230, Rochester 1, N. Y.
Delco Products Div., General Motors Corp., 329 E. First St., Dayton 1, O.
Delta-Star Electric Co., 2400 Block, Fulton St., Chicago, Ill.
Deming Co., 14 Aetna St., Salem, O.
Demuth & Sons, Charles, 245 Elm Place, Mineola, L. I., N. Y.
Dersch, Gesswein & Neuert, Inc., 4849 W. Grand Ave., Chicago 39, Ill.
Desmond-Stephan Mfg. Co., Urbana, O.
Desolvo Co., The, 719 Foreland St., Pittsburgh 12, Pa.
d'Este Div., Kaye & MacDonald, Inc., 11-15 Central Ave., West Orange, N. J.
De-Tec-Tronic Laboratories, Inc., 1227 N. Clark St., Chicago 10, Ill.
Detroit Brass & Malleable Works, 100 S. Campbell, Detroit 9, Mich.
Detroit Diesel Engine Div., General Motors Corp., 13400 W. Outer Dr., Detroit 23, Mich.
Detroit Lubricating Co., 5900 Trumball Ave., Detroit 8, Mich.
Detroit Stamping Co., 350 Midland Ave., Detroit 3, Mich.
●Detroit Stoker Co., Fifth Floor, General Motors Bldg., Detroit 2, Mich.
Devices, Inc., 214 E. 53 St., New York 22, N. Y.
DeVilbiss Co., The, 300 Phillips Ave., Toledo 1, O.
Devine Mfg. Co., J. P., Div. of H. K. Porter Co., Inc., 1932 Oliver Bldg., Pittsburgh 22, Pa.
Devoe & Raynolds Co., Inc., 44th St. and 1st Ave., New York 17, N. Y.
Dewey-Shepard Boiler Co., 1311 N. Capitol Ave., Indianapolis, Ind.
De Zurik Shower Co., Sartell, Minn.
Dial Light Co. of America, Inc., 900 Broadway, New York 3, N. Y.
Diamond Chain Co., Inc., 438 Kentucky Ave., Indianapolis 7, Ind.
Diamond Chemical Products, 17 E. 48th St., New York, N. Y.
Diamond Expansion Bolt Co., Inc., 500 North Ave., Garwood, N. J.
Diamond Iron Works, Inc., 1728 Second St. N., Minneapolis 11, Minn.
Diamond Machine Tool Co., 3429 E. Olympic Blvd., Los Angeles 23, Calif.
Diamond Mfg. Co., 253 W. Eighth St., Wyoming, Pa.
Diamond Power Specialty Corp., P. O. Box 415, Lancaster, O.
Diceler Div. of General Machine & Mfg. Co., Blair St. and Spring Garden Ave., Berwick, Pa.
Dick Co., Inc., R. & J., 24-48 Sade St., Passaic, N. J.
Dickinson, Aeolus, 3320 S. Artesian Ave., Chicago, Ill.
Diehl Mfg Co., Finderne Plant, 1106 Finderne Ave., Somerville, N. J.
Dietzgen Co., Eugene, 2425 Sheffield Ave., Chicago 14, Ill.
Dillon Co., Inc., W. C., 1421 S. Circle Ave., Forest Park, Ill.
Dillon Steam Boiler Wks., Inc., D. M., Crocker St., Fitchburg, Mass.
Division Lead Co., 836 W. Kinzie St., Chicago 22, Ill.
Dixon Crucible Co., Joseph, Wayne & Monmouth Sts., Jersey City 3, N. J.
Doall Co., The, 254 N. Laurel Ave., Des Plaines, Ill.
Dockson Corp., 3839 Wabash Ave., Detroit 8, Mich.
Dockstader, Inc., S. E., 1128 Munsey Bldg., Washington 4, D. C.
●Dodge Mfg. Corp., 500 S. Union St., Mishawaka, Ind.
Dole Refrigerating Co., 5910 N. Pulaski, Chicago 30, Ill.
●Dole Valve Co., The, 1933 Carroll Ave., Chicago 12, Ill.
●Dollinger Corp., 9 Centre Park, Rochester 3, N. Y.
Domestic Engine & Pump Co., Shippensburg, Pa.
Dover Metal Products Co., The, Canal Fulton, O.
Dow Chemical Co., The, Midland, Mich.
Dow Corning Corp., Midland, Mich.
Dowell Inc., 524 Kennedy Bldg., Tulsa 3, Okla.
Downingtown Iron Works, Wallace Ave., Downingtown, Pa.
Doyle & Roth Mfg. Co., Foot of 23rd St., Brooklyn 32, N. Y.
Doyle Vacuum Cleaner Co., 225 Stevens St., S. W., Grand Rapids 2, Mich.
●Dravo Corp., Machinery Div., Dravo Bldg., Pittsburgh 22, Pa.
Drayer & Hanson, Inc., 3301 Medford Ave., Los Angeles 33, Calif.
Dreis & Krump Mfg. Co., 7404 Loomis Blvd., Chicago 36, Ill.
Dreis Co., Ltd., Edward J., 841 County Rd., San Carlos, Calif.
Dresser Mfg. Div., Dresser Industries, Inc., 490 Fisher Ave., Bradford, Pa.
Drico Industrial Corp., 29 Broadway, New York 6, N. Y.
Drinkwater, Inc., Spring & Madison St., Waukegan, Ill.
Driv-Way Lite Co., P. O. Box 2850, Denver, Colo.
Dry Air Products Corp., 734 Jackson Place, Washington 6, D. C.
Drying Systems, Inc., 1812½ W. Foster Ave., Chicago 40, Ill.
Dryomatic Corp. of America, 1600 Union Ave., Baltimore 11, Md.
Dry-Zero Corp., Merchandise Mart, Chicago 54, Ill.
Dual-Air Fan Co., P. O. Box 169, South Elgin, Ill.
Ducon Co., 147 E. 2nd St., Mineola, N. Y.
Dudgeon, Inc., Richard, 789 Bergen St., Brooklyn 16, N. Y.
Duffy Engineering Co., 536 S. E. 6th, Portland 14, Ore.
●Dunham Co., C. A., 400 W. Madison St., Chicago 6, Ill.
Dunkirk Radiator Corp., Dunkirk, N. Y.
Duo-Therm Div., Motor Wheel Corp., Lansing 3, Mich.
du Pont de Nemours & Co., E. I., Polychemicals Dept., Wilmington 98, Del.
du Pont de Nemours & Co., E. I., Electrochemicals Dept., Wilmington 98, Del.
du Pont de Nemours & Co., Inc., E. I., Kinetic Chemicals Div., 10th and Market Sts., Wilmington 98, Del.
du Pont de Nemours & Co., Inc., E. I., Fabrics & Finishes Dept., Wilmington 98, Del.
du Pont de Nemours & Co., E. I., Grasselli Chemicals Dept., Wilmington 98, Del.
du Pont de Nemours & Co., E. I., Photo Products Dept., Wilmington 98, Del.
Durabla Mfg. Co., 114 Liberty St., New York 6, N. Y.
Durakool, Inc., 1010 N. Main St., Elkhart, Ind.
Duraloy Co., Scottdale, Pa.
●Durant Insulated Pipe Co., 1015 Runnymede St., P. O. Box 88, East Palo Alto, Calif.
Duriron Co., Inc., The, 450 U. Findlay St., Dayton 1, O.
Duro Co., 537 Monument Ave., Dayton, O.
Duro Metal Products Co., 2649 N. Kildare Ave., Chicago, Ill.
Dust Filter Co., 134 S. LaSalle St., Chicago 3, Ill.
Dust Suppression & Engineering Co., 154 Grove St., Lake Orion, Mich.
Dustlix Corp., 715 N. Van Buren St., Milwaukee, Wis.
●Dutton Boiler Div., Hapman-Dutton Co., 623 Gibson St., Kalamazoo 6, Mich.
●Dwyer Mfg. Co., F. W., 317 S. Western Ave., Chicago 12, Ill.
Dynamic Air Engineering, Inc., 1619 S. Alameda, Los Angeles 21, Calif.
Drus Fastener Co., Inc., P. O. Box 785, Babylon, N. Y.

E

●Eagan Co., Inc., Walter H., 2336-38 Fairmount Ave., Philadelphia 30, Pa.
Eagle Chemical Co., Inc., P. O. Box 1221, Joliet, Ill.
Eagle-Picher Co., American Bldg., Cincinnati 1, O.
Eastern Air Devices, Inc., 585 Dean St., Brooklyn 17, N. Y.
Eastern Foundry Co., Peerless Heater Div., Boyertown, Pa.
Eastern Industries Inc., 396 Elm St., New Haven 6, Conn.
Eastern Stainless Steel Corp., P. O. Box 1975, Baltimore 3, Md.
Eastman Kodak Co., Kodak Park, Rochester 4, N. Y.
Ebco Mfg. Co., 401 W. Town St., Columbus 8, O.
Eckhart Mfg. Co., Inc., 831 Lenign Ave., Union, N. J.
Eclipse Air Brush Co., Inc., 381 Park Ave., Newark, N. J.
●Eclipse Fuel Engineering Co., 707 S. Main St., Rockford, Ill.
Econocol Stoker Div. of Cotta Transmission Co., 2340 11th St., Rockford, Ill.
Economy Equipment Co., 919 W. 49th Pl., Chicago 9, Ill.
●Economy Pumps, Inc., 1000 Weller Ave., Hamilton, O.
Economy Valve Seat Co., 1436 N. Keating, Chicago 51, Ill.
Eddy Stoker Corp., 4717 W. North Ave., Chicago 39, Ill.
Eddy Valve Co., Waterford, N. Y.
Edge Moor Iron Wks., Inc., Edge Moor 25, Del.
Edison, Inc., Thomas A., Instrument Div., Lakeside Ave., West Orange, N. J.
Edward Valves, Inc., 1200 W. 145th St., East Chicago, Ind.
Ehret Magnesia Mfg. Co., Valley Forge, Pa.
Eiker Mfg. Co., Ogallala, Neb.
Eisler Engineering Co., Inc., 754 S. 13th St., Newark 3, N. J.
Elastic Porcelain Lining Corp., 221 Norris Dr., Rochester 10, N. Y.
Elastic Stop Nut Corp. of America, 2330 Vauxhall Rd., Union, N. J.
Elco Tool & Screw Corp., 1800 Broadway, Rockford, Ill.
Electradiant Corp., 500 Del Monte Ave., Monterey, Calif.
Electric Arc, Inc., 152 Jelliff Ave., Newark 8, N. J.
Electric Auto-Lite Co., Instrument & Gauge Div., Toledo 1, O.
Electric Controller & Mfg. Co., 2700 E. 79th St., Cleveland 4, O.
Electric Machinery Mfg. Co., 1331 Tyler St., N. E., Minneapolis 13, Minn.
Electric Motor Corp., Div. of Howard Industries, Inc., Racine, Wis.
Electric Sprayit Co., The, 1415-25 Illinois Ave., Sheboygan, Wis.
Electric Steel Foundry Co., 2141 N. W. 25th St., Portland, Ore.
Electrimatic Co., Sales Affiliate, Jas. P. Marsh Corp., 3501 Howard St., Skokie, Ill.
Electro Dynamic, Div. of the Electric Boat Co., Bayonne, N. J.
Electro Products Laboratories, Inc., 4501 N. Ravenswood Ave., Chicago, Ill.
Electro Rust-Proofing Corp., Belleville, N. J.
Electrol Burner Mfg. Co., Inc., 22 Union Ave., Rutherford, N. J.
Electromode Corp., 45 Crouch St., Rochester 3, N. Y.
Electro-Switch & Controls Inc., 8568 W. Washington Blvd., Culver City, Calif.
Electrovent Fan & Mfg. Co., 812 W. Lake St., Chicago 7, Ill.
Elgin Softener Corp., Elgin, Ill.
Elgo Shutter & Mfg. Co., 2738 W. Warren Ave., Detroit 8, Mich.
Elliott Co., Jeannette, Pa.
Ellis Drier Co., 2444 N. Crawford Ave., Chicago 39, Ill.
Ellison Draft Gage Co., 214 W. Kinzie St., Chicago 10, Ill.
Ellsworth Pipe & Supply Co., 513 W. Traser St., Milwaukee 3, Wis.
Elraco Engineering Co., 732 W. 58th St., Los Angeles 37, Calif.
Emerson Electric Mfg. Co., The, 8100 Florissant Ave., St. Louis 21, Mo.

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Empire Sheet & Tin Plate Co., N. Bowman St., Mansfield, O.
Empire Ventilation Equipment Co., 35-39 Vernon Blvd., Long Island City, N. Y.
Enderle, Inc., Ltd., Frank X., 1715 San Fernando Rd., Los Angeles 65, Calif.
Endura Mfg. Corp., 45 N. 4th St., Quakertown, Pa.
Engelhard, Inc., Charles, 900 Passaic Ave., East Newark, N. J.
Engineer Co., 75 West St., New York 6, N. Y.
Engineered Products Co., 6121 Morton St., Philadelphia 44, Pa.
Enterprise Engine & Machinery Co., Div. of General Metals Corp., 18th & Florida Sts., San Francisco 10, Calif.
Equipoise Controls, 100 Stevens Ave., Mount Vernon, N. Y.
Erdle Perforating Co., 171 York St., Rochester 11, N. Y.
Ergolyte Mfg. Co., 3627 Lawrence St., N., Philadelphia 40, Pa.
Erickson Specialty Co., 10 Cayuga St., P. O. Box 141, Cohoes, N. Y.
Erie Bolt & Nut Co., Erie, Pa.
Erie City Iron Wks., 1450 East Ave., Erie, Pa.
Erie Tool Wks., 11th & French Sts., Erie 2, Pa.
Ess Instrument Co., 96 Washington Ave., Bergenfield, N. J.
Ess Specialty Corp., 96 S. Washington Ave., Bergenfield, N. J.
Essex Wire Corp., 37 Manchester Ave., Detroit, Mich.
Essick Mfg. Co., 1950 Santa Fe Ave., Los Angeles 21, Calif.
Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y.
Even-Ray Co., Inc., 93 Tiffany Blvd., Newark 4, N. J.
Everhot Products Co., 2059 W. Carroll, Chicago 12, Ill.
Everite Pump & Mfg. Co., Inc., P. O. Box 1391, Lancaster, Pa.
Everlasting Valve Co., 49 Fisk St., Jersey City 5, N. J.
Ewing Mfg. Co., 2545 N. W. 10th, Oklahoma City 7, Okla.
Excelsior Leather Washer Mfg. Co., 720-730 Chestnut St., Rockford, Ill.
Excelsior Steel Furnace Co., The, 118 S. Clinton St., Chicago 6, Ill.
Excelsior Tool & Machine Co., 31st & Ridge Ave., East St. Louis, Ill.
Extruded Plastics, Inc., New Canaan Ave., Norwalk, Conn.
E-Zee Tool Mfg. Corp., 136 Liberty St., New York 6, N. Y.

F

Fasco Industries, Inc., P. O. Box 509, Rochester 2, N. Y.
Faber Engineering Co., Inc., Amber & Westmoreland Sts., Philadelphia, Pa.
Fabreeka Products Co., Inc., 222 Summer St., Boston, Mass.
Fafnir Bearing Co., 37 Booth St., New Britain, Conn.
●Fairbanks Co., 393 Lafayette St., New York 3, N. Y.
Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.
Fairmont Aluminum Co., Fairmont, W. Va.
Falcon Equipment Co., 13th St., New Brighton, Pa.
Falk Corp., 3010 W. Canal St., Milwaukee 8, Wis.
Falstrom Co., 26 Falstrom Court, Passaic, N. J.
Famco Machine Co., 1314 18th St., Racine, Wis.
Farley Sleeve & Hanger Co., 3748 E. 71st St., Cleveland, O.
Farquhar Co., A. B., 142 N. Duke St., York, Pa.
●Farr Co., 2615 Southwest Dr., Los Angeles 43, Calif.
Farrar & Trefts, 20 Milburn St., Buffalo 12, N. Y.
Farris Engineering Corp., 400 Commercial Ave., Palisades Park, N. J.
Farris Stacon Corp., 563 Commercial Ave., Palisades Park, N. J.
●Fedders-Quigan Corp., 57 Tonawanda St., Buffalo 7, N. Y.
Federal Boiler Co., Inc., Granite & West Sts., Midland Park, N. J.
Federal Machine & Welder Co., The, Overland Ave., Warren, O.
Federal-Mogul Corp., 11031 Shoemaker St., Detroit 13, Mich.
Federated Metals Div., American Smelting & Refining Co., 120 Broadway, New York 5, N. Y.
Fee & Mason Mfg. Co., Inc., Manasquan, N. J.
Fee and Stemwedel, Inc., 2210 Wabansia Ave., Chicago 47, Ill.
Felt Products Mfg. Co., 1504 Carroll Ave., Chicago 7, Ill.
Felters Company, The, 210 South St., Boston 11, Mass.
Fenwal, Inc., 200 Pleasant St., Ashland, Mass.
Ferguson & Lange Foundry Co., 1039 Willow St., Chicago, Ill.
Fern, Ralph, 2517 Boulevard Ave., Scranton 9, Pa.
Ferro-Nil Corp., 381 Fourth Ave., New York 16, N. Y.
Field Control Div., H. D. Conkey & Co., Mendota, Ill.
Filtair Mfg. Co., 487 S. Van Ness Ave., San Francisco 3, Calif.
Filtrine Mfg. Co., Inc., 53A Lexington Ave., Brooklyn 5, N. Y.
Fingles Co., The, Reistertown Rd. at Elgin Ave., Baltimore 17, Md.
Finn & Co., Inc., T. R., 333 Jackson Ave., New York 54, N. Y.
Finn Engineers, Jerry, 634 Grand Ave., St. Paul 5, Minn.
Fintube Coil Corp., 19 W. Main St., Alhambra, Calif.
Fire-King Stoker Co., 3760 E. St. Clair, Indianapolis, Ind.
Fireline Stove & Furnace Lining Co., 1800 Kingsbury St., Chicago 14, Ill.
Firestone Industrial Products, 1200 Firestone Pkwy., Akron 17, O.
Fir-Tex Insulating Board Co., St. Helens, Ore.
Fischer & Porter Co., 600 County Line Rd., Hatboro, Pa.
Fish-Schurman Corp., 230 E. 45th St., New York 17, N. Y.
●Fisher Governor Co., 205 S. First Ave., Marshalltown, Ia.
Fisher Research Laboratory, Inc., 1961 University Ave., Palo Alto, Calif.
Fitch, Allen & Co., 1131 Bryn Mawr Ave., Chicago 40, Ill.
●Fitzgibbons Boiler Co., Inc., 101 Park Ave., New York 17, N. Y.
Flagg & Co., Inc., Stanley G., 1421 Chestnut St., Philadelphia 2, Pa.
Flemm Lead Co., Inc., Bradley Ave. & School St., Long Island City 1, N. Y.
Flexible Tubing Corp., Branford, Conn.
Flexitallic Gasket Co., 8th & Bailey Sts., Camden, N. J.
Flexlock Corp., 411 E. Market St., Akron, O.
Flexo Supply Co., Inc., 4649 Page Blvd., St. Louis 13, Mo.
Flexrock Co., 36 & Filbert Sts., Philadelphia 4, Pa.
Flintkote Co., The, 30 Rockefeller Plaza, New York 20, N. Y.
Flori Pipe Co., The, 601 E. Red Bud Ave., St. Louis 15, Mo.
Floridin Co., Warren, Pa.
Fluid Heat Div., Anchor Post Products, Inc., 6500 Eastern Ave., Baltimore 24, Md.
Fluid Systems, Inc., 1881 Dixwell Ave., New Haven, Conn.
Fluor Corp., Ltd., The, 2500 S. Atlantic Blvd., Los Angeles 22, Calif.
Flynn & Emrich Co., 301 Holliday St., Baltimore 2, Md.
Follansbee Steel Corp., 3rd and Liberty Aves., Pittsburgh, Pa.
Forney Engineering Co., 2705 Hawes St., Dallas 9, Tex.
Forty-Eight Insulations, Inc., N. Aurora St., Aurora, Ill.
Fossum, M. H., 2086 Marshall Ave., St. Paul, Minn.
Foster Co., Benjamin, 4635 W. Girard Ave., Philadelphia 31, Pa.
Foster Engineering Co., 835 Lehigh St., Union, N. J.
Foster Pump Wks., Inc., 46-A Washington St., Brooklyn 1, N. Y.
Foster Wheeler Corp., 165 Broadway, New York 6, N. Y.
Fox Control & Mfg. Co., 3589 E. 93rd St., Cleveland, O.
Foxboro Co., 106 Neponset Ave., Foxboro, Mass.
Fram Corp., Providence 16, R. I.
France Packing Co., 6512 State Rd., Tacony, Philadelphia 35, Pa.
Franklin Electric Co., Inc., Bluffton, Ind.
Frederick Iron & Steel Inc., E. 7th St., Frederick, Md.
Freed Products Co., 1510 Third Ave., Moline, Ill.
Freeman Stoker Div., Illinois Iron & Bolt Co., 914 S. Michigan Ave., Chicago 5, Ill.
Fresh'nd-Aire Co., Div. of Cory Corp., 221 N. LaSalle St., Chicago 1.
Fretz-Moon Tube Co., Inc., Butler, Pa.
●Frick Co., Waynesboro, Pa.
Friermood Machine Works, Converse, Ind.
Friez Instrument Div., Bendix Aviation Corp., Taylor Ave., Towson, Baltimore 4, Md.
Frigidaire Div., General Motors Corp., Dayton 1, O.
Frost Mfg. Co., S. Henderson St., Galesburg, Ill.
Fuel Savers, Inc., 15th and Herr Sts., Harrisburg, Pa.
Fuelguard Co., 2826 Fondren Dr., Dallas 5, Tex.
Fulflo Specialties Co., Inc., The, Blanchester, O.
Fuller Co., 124 Bridge St., Catasauqua, Pa.
●Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Box 400, Knoxville 4, Tenn.
Furnas Electric Co., Batavia, Ill.

G

G. D. S. Machinery & Supply Co., Inc., 101 Walker St., New York, N. Y.
G & H Mfg. Co., 3047 Amber St., Philadelphia 34, Pa.
G. M. Mfg. Co., 50 W. 3rd St., New York 12, N. Y.
●G & O Mfg. Co., 138 Winchester Ave., New Haven 8, Conn.
●Gallaher Co., The, Owatonna, Minn. & Omaha, Neb.
Galv-Weld Products, 602 Cook Tower, Lima, O.
Gannon Co., Inc., Russell R., The, 5037 Beech St., Cincinnati 12, O.
Garden City Fan Co., 332 S. Michigan Ave., Chicago 4, Ill.
Garden City Instruments, Inc., 608 S. Dearborn St., Chicago 5, Ill.
Gardiner Metal Co., 2514 W. 48th Pl., Chicago 32, Ill.
Gardner-Denver Co., Quincy, Ill.
Garlock Packing Co., 50 Main St., Palmyra, N. Y.
Gas & Oil Industry Laboratories, Inc., 4 Paine Ave., Irvington, N. J.
Gasflux Co., Mansfield, O.
Gates Engineering Co., P. O. Box 1711, Wilmington, Del.
Gates Rubber Co., The, 999 S. Broadway, Denver 17, Colo.
Gatke Corp., 228 N. LaSalle St., Chicago 1, Ill.
Gehri Co.. 1117 Tacoma Ave.. Tacoma 3, Wash.
●General Automatic Products Corp., 2300 Sinclair Lane, Baltimore 13, Md.
●General Blower Co., 8610 Ferris Ave., Morton Grove, Ill.
●General Blower Co., Inc., 6137 Market St., Philadelphia 39, Pa.
General Ceramics & Steatite Corp., Keasbey, N. J.
●General Controls Co., 801 Allen Ave., Glendale 1, Calif.
General Corporation, 3353 University Ave., Minneapolis 14. Minn.
General Die and Stamping Co., 262-272 Mott St., New York 12, N. Y.
General Electric Co., Air Conditioning Dept., 5 Lawrence St., Bloomfield, N. J.
●General Electric Co., Apparatus Dept., 1 River Rd., Schenectady 5, N. Y.
General Electric Co., Chemical Dept., 1 Plastics Ave., Pittsfield, Mass.
General Electric Co., Lamp Dept., Nela Park, Cleveland 12, O.
General Engineering & Mfg. Co., 4417 Oleatha St., St. Louis 16, Mo.
General Filter Co., 923 Second Ave., Ames, Ia.
General Filters, Inc., 12890 Westwood, Detroit 23, Mich.
General Fittings Co., 123 Georgia Ave., Providence 5, R. I.
●General Gas Light Co., 212 N. Park, Kalamazoo 11F, Mich.
General Heaters & Regulators Co., 4102 S. LaSalle St., Chicago 9.
General Insulating Products Co., 8821 15th Ave., Brooklyn, N. Y.
General Machinery Co., 3500 Riverside Ave., Spokane 1, Wash.
General Products Co., 1205-07 Hamilton St., Philadelphia, Pa.
General Ozone Corp., 1455 W. Congress St., Chicago 7, Ill.
General Plate Div., Metals & Controls Corp., 34 Forest St., Attleboro, Mass.
General Power Plant Corp., 381-4th Ave., New York 16, N. Y.
General Refrigeration Div., Yates-American Machine Co., Beloit, Wis.
General Scientific Equipment Co., 27th & Huntingdon Sts., Philadelphia 32, Pa.
Genspring, Inc., 500 Fifth Ave., New York 18, N. Y.
Gerett Corp., M. A., 724 W. Winnebago St., Milwaukee 5, Wis.
Germatrol Corp., 622 Brookline Blvd., Pittsburgh 26, Pa.
Gerstein & Cooper Inc., 1 W. 3rd St., South Boston, Mass.
Giannini & Co., Inc., G. M., 254 W. Colorado St., Pasadena 1, Calif.
Giant Mfg. Co., South Ave., Council Bluffs, Ia.

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Gilbert & Barker Mfg. Co., West Springfield, Mass.
Gilbert Brass Foundry Co., 5028 Farlin St., St. Louis, Mo.
Gil-Lair Products, Inc., 81 Masonic Ct., Pasadena 3, Calif.
Gilmer Company, L. H., Div. of United States Rubber Co., Tacony, Philadelphia 35, Pa.
Gisholt Machine Co., 1253 E. Washington Ave., Madison 10, Wis.
Glaser Lead Co., Inc., 31 Wyckoff Ave., Brooklyn, N. Y.
●Glassfloss, 155 E. 44th St., New York 17, N. Y.
Gleason-Avery, Inc., 27 Clark St., Auburn, N. Y.
Glenn-Roberts Co., Inc., 2107 Adams St., Indianapolis 18, Ind.
Globe Phone Mfg. Co., 2 Linden St., Reading, Mass.
Globe Steel Tubes Co., 3839 W. Burnham St., Milwaukee 4, Wis.
Goese Mfg. Co., 2548 N. 18th St., Milwaukee 6, Wis.
Goethel Sheet Metal Wks., Alfred, 1910 N. Killian Pl., Milwaukee, Wis.
Goettl Bros. Metal Prod. Inc., 714 S. Central Ave., Phoenix, Ariz.
Golden-Anderson Valve Specialty Co., Keenan Bldg., Pittsburgh, Pa.
Goldens' Foundry & Machine Co., Columbus, Ga.
Gold Top Heating, Inc., 1400 E. Second St., Butte, Mont.
Goodfellow Co., E. D., 496 E. Bodley Ave., Memphis, Tenn.
Goodrich Co., B. F., 548 S. Main St., Akron 18, O.
Goodyear Tire & Rubber Co., 1144 E. Market St., Akron 16, O.
Goodyer Industries, Inc., 224 S. Michigan Ave., Chicago 4, Ill.
Gordon & Piatt, P. O. Box 331, Winfield, Kan.
Gorman-Rupp Co., Mansfield, O.
Gorton Heating Corp., Cranford, N. J.
Goss Gas Inc., 5209 Baum Blvd., Pittsburgh 24, Pa.
Gotham Instrument Co., Div., American Machine & Metals, Inc., 149 Wooster St., New York 12, N. Y.
Goulds Pumps, Inc., Fall St., Seneca Falls, N. Y.
●Governair Corp., 513 N. Blackwelder St., Oklahoma City 1, Okla.
Grabler Mfg. Co., 6565 Broadway, Cleveland 5, O.
Graham Mfg. Co., Inc., 415 Lexington Ave., New York 17, N. Y.
Graham Transmissions, Inc., 3754 N. Holton St., Milwaukee 12, Wis.
Granite City Steel Co., 20th & Madison Ave., Granite City, Ill.
●Grant Wilson Inc., 315 S. Sherman St., Suite 2254, Chicago 4, Ill.
Graton & Knight Co., 356 Franklin St., Worcester 4, Mass.
Graver Water Conditioning Co., 216 W. 14th St., New York 11, N. Y.
Gray Co., Inc., Graco Square, Minneapolis 13, Minn.
Gray Metal Products, Inc., 30 Carleton St., Rochester, N. Y.
Great National Air Conditioning Corp., 342 Oklahoma Natural Bldg., Oklahoma City, Okla.
Green Fire Brick Co., A. P., Mexico, Mo.
Green Fuel Economizer Co., 780 Main St., Beacon, N. Y.
Greene, Tweed & Co., North Wales, Pa.
Greenfield Tap & Die Corp., Sanderson St., Greenfield, Mass.
●Greenlee Tool Co., Div. of Greenlee Bros. & Co., 2136 12th St., Rockford, Ill.
Greer Hydraulics, Inc., 454 18th St., Brooklyn 15, N. Y.
Greiner Co., Emil, 161 Sixth Ave., New York, N. Y.
Greyhound A. C. Arc Welder Corp., 606 Johnson Ave., Brooklyn 6, N. Y.
Grief, Edward C., 64 West End Ave., Bogota, N. J.
Griffin & Co., Inc., 500 Bergman Ave., Louisville, Ky.
Griffith Equipment Co., Inc., Los Angeles, Calif.
●Grinnell Co., Inc., 260 W. Exchange, Providence 1, R. I.
Grip Nut Co., 310 S. Michigan Ave., Chicago, Ill.
Griscom-Russell Co., The, 285 Madison Ave., New York 17, N. Y.
Grobet File Corp. of America, 421 Canal St., New York 13, N. Y.
Gro-Quick Co., 340 W. Huron St., Chicago 10, Ill.
Gross-Aire Mfg. Co., 9416 W. Milton Ave., Overland 14, Mo.
Grove Regulator Co., 6529 Hollis St., Oakland, Calif.
Guardian Electric Mfg. Co., 1621 W. Walnut St., Chicago 12, Ill.
Guardian Products Corp., 1215 E. 2nd St., Michigan City, Ind.
Guild & Garrison, Inc., 43 Keap St., Brooklyn 11, N. Y.
Gulf Oil Corp., P. O. Box 1166, Gulf Bldg., Pittsburgh 30, Pa.
Gunnite Foundries Corp., 302 Peoples Ave., Rockford, Ill.
●Gustin Bacon Mfg. Co., 1412 W. 12th St., Kansas City 7, Mo.
Guth Co., Edwin F., 2615 Washington Blvd., St. Louis 3, Mo.

H

H-A Mfg. Co., 444 Salem Ave., York, Pa.
H. & A. Co., 86-100 Leroy Ave., Buffalo 14, N. Y.
H-B Instrument Co., 2633 Trenton Ave., Philadelphia 25, Pa.
H & H Tube & Mfg. Co., 245-275 N. Forman Ave., Detroit 17, Mich.
Haering & Co., Inc., D. W., P. O. Box 6037, Harlandale Sta., San Antonio, Tex.
Haertel Co., Walter, 2840 4th Ave., S., Minneapolis, Minn.
Hagan Corp., Hagan Bldg., Pittsburgh 30, Pa.
Hager Bros., East P. O. Box 1511, Rockford, Ill.
Hague & Co., Alfred, 230 Thirty-fourth St., Brooklyn 32, N. Y.
Haines & Co., Inc., William S., Div. Sellers Injector Corp., 1010-12-14 Wood St., Philadelphia 7, Pa.
Halowax Products Div., Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Halstead & Mitchell, Bessemer Bldg., Pittsburgh 22, Pa.
Hamburg Boiler Wks., Inc., Grand St., Hamburg, Pa.
Hamer Oil Tool Co., 2919 Gardenia Ave., Long Beach 6, Calif.
Hamilton Rubber Mfg. Corp., Box 361, Trenton 3, N. J.
Hammel-Dahl Co., 243 Richmond St., Providence 3, R. I.
Hammett Electric Mfg. Co., 706-708 E. 18th St., Kansas City 8, Mo.
Hammond Brass Wks., Summer Blvd., Hammond, Ind.
Hampton-Cross Co., The, 120 S. 10th St., Louisville 2, Ky.
Hampton Electric Mfg. Co., 1238 Voskamp St., Pittsburgh 12, Pa.
Handy & Harman, 82 Fulton St., New York 7, N. Y.
Haney Gas Burner & Engineers, 909 S. Myrtle Ave., Monrovia, Calif.
Hanovia Chemical & Mfg. Co., 100 Chestnut St., Newark 5, N. J.
Hansen Mfg. Co., Inc., Princeton 6, Ind.
Hanson-Gates Mfg. Co., Inc., 174 Lowell St., Reading, Mass.
Hardinge Oil Burner & Mfg. Co., 1700 Berteau St., Chicago 13, Ill.
Hardy, Inc., Charles, 420 Lexington Ave., New York, N. Y.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis.
Harper Co., H. M., Morton Grove, Ill.
●Harrington & King Perforating Co., 5655 Fillmore St., Chicago 44, Ill.
Harris, A. R., 4548 Hohman Ave., Hammond, Ind.
Harris Calorific Co., The, 5501 Cass Ave., N. W., Cleveland 2, O.
Harris & Co., Arthur, 210 N. Aberdeen St., Chicago 7, Ill.
Harrisburg Machinery Corp., 7th & Curtin St., Harrisburg, Pa.
Harrisburg Steel Corp., 10th & Herr Sts., Harrisburg, Pa.
Harry Cooling Towers, Inc., 125 Cedar St., New York 6, N. Y.
Hart & Cooley Mfg. Co., Holland, Mich.
Hart Mfg. Co., The, Hamilton St., Hartford 1, Conn.
Hartmann Co., Chas., 985 Dean St., Brooklyn, N. Y.
Hartzell Propeller Fan Co., P. O. Box 909, Roosevelt Ave., Piqua, O.
Harvey-Whipple, Inc., Springfield, Mass.
Hasco Valve & Machine Co., 1263 N. 70th St., Milwaukee 13, Wis.
Haskell Mfg. Co., Wm. H., 20 Commerce St., Pawtucket, R. I.
Hastings Air Conditioning Co., Box 481, 108 S. Colorado Ave., Hastings, Neb.
Hastings Instrument Co., P. O. Box 1275, Hampton, Va.
Hausman Mfg. & Sales Co., Dept. HP, 1243 N. Harding Ave., Chicago 51, Ill.
Haveg Corp., Newark, Del.
Haydon Mfg. Co., Inc., Sub. General Time Instruments Corp., Torrington, Conn.
●Hayes Furnace & Mfg. Co., 2929 S. Fairfax Ave., Los Angeles 16, Calif.
●Hays Corp., 782 E. 8th St., Michigan City, Ind.
Hays Mfg. Co., 801 W. 12th St., Erie, Pa.
Health Trola Div., Excel Heating & Air Conditioning Co., 3715 Belmont Ave., Chicago 18, Ill.
Healy Ruff Co., 2257 University Ave., St. Paul 4, Minn.
Heartley Machine & Tool Co., 900-8 Summit St., Toledo, O.
Heat Equipment not Inc., 1020 E. 75th St., Chicago 19, Ill.
Heat Timer Corp., 160 Fifth Ave., New York 10, N. Y.
Heat Transfer Products, Inc., P. O. Box 516, Carbondale, Pa.
Heat-X-Changer Co., Inc., The, 250 E. 43rd St., New York, N. Y.
Heating Assurance, Inc., 124 E. Augusta St., Spokane 13, Wash.
Hegeler Zinc Co., P. O. Box 599, Danville, Ill.
Heilman Boiler Wks., Allentown, Pa.
Helicoid Gage Div., American Chain & Cable Co., Inc., Bridgeport 2, Conn.
Hendley & Whittemore, 6 Blackhawk Blvd., Beloit, Wis.
Hendrick Mfg. Co., 37 Dundaff St., Carbondale, Pa.
Henkel-Clauss Co., The, Fremont, O.
Henry Furnace Co., The, Medina, O.
●Henry Valve Co., Melrose Park, Ill.
Henry & Wright, Div. of Hartford-Empire Co., 760 Windsor St., Hartford, Conn.
Her-Born Engineering & Mfg. Co., 212 Columbus Ave., Sandusky, O.
Herbusch Corp., The, 706 Chestnut St., 210 Title Guaranty Bldg., St. Louis 1, Mo.
Hercules Chemical Co., Inc., 332 Canal St., New York 13, N. Y.
Hercules Electric & Mfg. Co., Inc., 2500 Atlantic Ave., Brooklyn 7, N. Y.
Heremetal Co., 1310 Aldrich Ave., N. Minneapolis 11, Minn.
Heresite & Chemical Co., Manitowoc, Wis.
Hersey Mfg. Co., South Boston, Mass.
Hershey Machine & Foundry Co., Motorstoker Div., Manheim, Pa.
Hertner Electric Co., The, 12690 Elmwood Ave., Cleveland 11, O.
Hess Co., The, 132 N. Clinton St., Chicago 6, Ill.
Hetzel Roofing Products Co., 67 Maine St., Newark 5, N. J.
Hexdall Co., A. M., Morris, Ill.
Highside Chemicals Co., 10 Colfax Ave., Clifton, N. J.
Hill Diesel Engine Corp., Lansing 3, Mich.
Hill, E. Vernon & Co., 6829 W. Highland Ave., Chicago 31, Ill.
Hills-McCanna Co., 3025 N. Western Ave., Chicago 18, Ill.
Hilo Varnish Corp., 55 Stewart Ave., Brooklyn 6, N. Y.
Hinde & Dauch Paper Co., P. O. Box 861, Sandusky, O.
Hinderliter Tool Co., The, Div. of the H. K. Porter Co., Inc., 1150 N. Peoria St., Tulsa, Okla.
Hirschman-Pohle Co., Inc., 12 Lent Ave., LeRoy, N. Y.
Hobart Bros., Co., Troy 1, O.
Hobsite Products Co., 835 River St., Paterson 4, N. J.
Hodge Boiler Wks., 99-111 Sumner St., East Boston 28, Mass.
Hodgman Mfg. Co., 135 Washington St., Taunton, Mass.
Hoffman Combustion Engineering Co., 710 Marquette Bldg., Detroit, Mich.
●Hoffman Specialty Co., 1001 York St., Indianapolis 7, Ind.
Hogan & Co., Inc., C. T., 383 Madison Ave., New York 17, N. Y.
Holby Valve Co., 1146 Second Ave., New York 21, N. Y.
Holcomb & Hoke Mfg. Co., Inc., 1545 Van Buren, Indianapolis 7, Ind.
Hollands Mfg. Co., Erie, Pa.
Holsclaw Bros., Inc., 418 Willow Rd., Evansville 11, Ind.
Holtum Mfg. Co., Freeport, Ill.
Homestead Valve Mfg. Co., P. O. Box 348, Coraopolis, Pa.
Hood Refining Co., 182 N. Hamilton Ave., Greensburg, Pa.
Hook & Ackerman, Inc., 18 E. 41st St., New York 17, N. Y.
Hoover Co., Kingston-Conley Div., 68 Brook Ave., North Plainfield, N. J.
Hoppes Mfg. Co., Inc., 850 N. Belmont Ave., Springfield, O.
Horn Co., Inc., A. C., 10th St. & 44th Ave., Long Island City, N. Y.
Horton Mfg. Co., 3016 University Ave., S. E., Minneapolis 14, Minn.
Hossfeld Mfg. Co., 460 W. Third St., Winona, Minn.
Hotpoint Inc., 5600 W. Taylor St., Chicago 44, Ill.

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Hotstream Heater Co., 2363 E. 69th St., Cleveland 4, O.
Houghton & Co., E. F., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Howard Iron Wks. & Alberger Heater Div., 287 Chicago St., Buffalo 4, N. Y.
Howe Ice Machine Co., 2825 Montrose Ave., Chicago 18, Ill.
Howell Electric Motors Co., Howell, Mich.
Howes-Woods Co., 201 Bridge St., Cambridge, Mass.
Hubbell Corp., P. O. Box 700, Hawley Rd., Mundelein, Ill.
Humboldt Mfg. Co., 2016 N. Whipple St., Chicago, Ill.
Hunt & Son, C. B., Inc., Salem, O.
Hunter Fan & Ventilating Co., Inc., 400 S. Front St., Memphis, Tenn.
Hupp Corp., Globe Stamping Div., 1250 W. 76th St., Cleveland 2, O.
Huron Boiler Co., 12436 Van Dyke Ave., Detroit 34, Mich.
Hussey & Co., C. G., 2850 Second Ave., Pittsburgh 19, Pa.
Huyette Co., Inc., Paul B., 401 N. Broad St., Philadelphia 8, Pa.
Hyatt Bearings Div., General Motors Corp., Harrison, N. J.
Hydro-Aire, Inc., 3000 Winona, Burbank, Calif.
Hypro Engineering Co., 440 N. Washington Ave., Minneapolis, Minn.

I

Ideal Electric & Mfg. Co., E. First & Oak Sts., Mansfield, O.
Ideal Industries, Inc., 1096 Parke Ave., Sycamore, Ill.
Iden Mfg. Co., 1809 N. Milwaukee Ave., Chicago 47, Ill.
Ilg Electric Ventilating Co., 2841 N. Crawford Ave., Chicago 41, Ill.
●Illinois Engineering Co., 2035 S. Racine Ave., Chicago 8, Ill.
Illinois Malleable Iron Co., 1801 Diversey Parkway, Chicago 14, Ill.
Illinois Oil Products, Inc., 4th Ave. and 24th St., Rock Island, Ill.
Illinois Testing Laboratories, Inc., 420 N. La Salle St., Chicago 10, Ill.
Illinois Zinc Co., 2959 W. 47th St., Chicago 32, Ill.
Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago 7, Ill.
Imperial Electric Co., 64 Ira Ave., Akron, O.
Independent Pneumatic Tool Co., 753 Claim, Aurora, Ill.
●Independent Register Co., 3747 E. 93rd St., Cleveland 5, O.
Indiana Fan Company, 427 S. Alabama St., Indianapolis 4, Ind.
Industrial Engineering Corp., Terre Haute, Ind.
Industrial Engineering & Equipment Co., 711 S. Theresa Ave., St. Louis 3, Mo.
Industrial Mfg. & Engineering Co., 3845 N. Ravenswood Ave., Chicago 13, Ill.
Industrial Metal Protectives, Inc., 401 Homestead Ave., Dayton 8, O.
Industrial Screw Co., 711 W. Lake St., Chicago 6, Ill.
Industrial Service Laboratories, 7656 W. Forest Home Ave., Milwaukee 14, Wis.
●Industrial Sound Control, Inc., 45 Granby St., Hartford, Conn., and 2119 S. Sepulveda Blvd., Los Angeles, Calif.
●Infra Insulation, Inc., 10 Murray St., New York, N. Y.
Ingersoll Products Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago 4, Ill.
●Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.
Ingersoll Steel Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago 4, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago 3, Ill.
Inland Steel Products Co., P. O. Box 393, Milwaukee 1, Wis.
Inner-Tite Div. of Yara Engineering Corp., 18 W. Jersey St., Elizabeth 4, N. J.
Instant Drying Corp., 101 Park Ave., New York, N. Y.
Insto-Gas Corp., 1977 E. Woodbridge St., Detroit 7, Mich.
Instrument Associates, Inc., 134 Broadway, Brooklyn 11, N. Y.
Insulite Div. Minnesota and Ontario Paper Co., 500 Baker Arcade Bldg., Minneapolis 2, Minn.
Insul-Wool Insulation Corp., 121 N. Dodge, Wichita 12, Kans.
Inter-Coastal Paint Corp., 13th St. and Southern R. R., East St. Louis, Ill.
Interchemical Corp., Finishes Div., 57 State St., Newark 1, N. J.
International Boiler Works Co., The, East Stroudsburg, Pa.
International Engineering, Inc., 1145 Bolander Ave., Dayton 1, O.
International Engineering Wks., Inc., Box 71, Framingham, Mass.
International Heater Co., 101 Park Ave., Utica 2, N. Y.
International Mfg. Co., 600 E. Grand Ave., Oklahoma City, Okla.
International Metal Products Co., Phoenix, Ariz.
International Moistening Co., 489 S. Main St., Providence, R. I.
International Nickel Co., Inc., The, 67 Wall St., New York 5, N. Y.
International Powder Metallurgy Inc., Ridgway, Pa.
International Register Co., 2624 W. Washington Blvd., Chicago 12, Ill.
International Sales Co., 2045 Evans Ave. San Francisco 24, Calif.
International Steel Co., 1545 Edgar St., Evansville, Ind.
International Vermiculite Co., Girard, Ill.
Interstate Sales Co., 123 E. 18th St., New York 3, N. Y.
Iona Ventilator Co., Inc., 2821-29 W. Dauphin St., Philadelphia 32,
Iron City Chemical Co., Evans City, Pa.
Iron Fireman Mfg. Co., 3170 W. 106 St., Cleveland 11, O.
Iron Lung Ventilator Co., 4019 Prospect Ave., Cleveland 3, O.
Irvington Varnish and Insulator Co., 6 Argyle Terrace, Irvington 11, N. J.
Isoflex Corp., 989 Folsom St., San Francisco 7, Calif.
Iwan Brothers, Inc., 1503 Prairie Ave., South Bend 14, Ind.

J

J O Mfg. Co., 8442 Otis St., South Gate, Calif.
Jabsco Pump Co., 2031 Lincoln St., Burbank, Calif.
Jack & Heintz Precision Industries, Inc., Cleveland 1, O.
Jackson Co., Byron, P. O. Box 2017, Terminal Annex, Los Angeles 54.
●Jackson & Church Co., 321 N. Hamilton Ave., Saginaw 65, Mich.
Jacobs Co., B. & J., 1729 John St., Cincinnati 14, O.
Jacuzzi Bros., Inc., 5327 Jacuzzi Ave., Richmond, Calif.
Jaden Mfg. Co., 1601 Second St., Hastings, Neb.
James-Pond-Clark, 1247 E. Green, Pasadena, Calif.
Jamieson Mfg. Co., 819 Bedford, Dallas, Tex.
●Jan Air, Inc., Richmond, Ill.
Janette Mfg. Co., 556 W. Monroe St., Chicago 6, Ill.
Jarecki Valve Div., H. K. Porter Co., Inc., Tulsa, Okla.
Jefferson Electric Co., 25th & Madison St., Bellwood, Ill.
●Jefferson Union Co., 607 W. 26th St., New York 1, N. Y.
Jeffrey Mfg. Co., 859 N. Fourth St., Columbus 16, O.
●Jenkins Bros., 100 Park Ave., New York 17, N. Y.
●Jenn Air Products Co., 409 Architects Bldg., Indianapolis, Ind.
Jennison Co., 87 Putnam St., Fitchburg, Mass.
Jessop Steel Co., Washington, Pa.
Jewel Mfg. Co., 1841 University Ave., St. Paul 4, Minn.
Johns-Manville, 22 E. 40th St., New York 16, N. Y.
Johnson Bronze Co., 460 S. Mill St., New Castle, Pa.
Johnson Co., S. T., 401 N. Broad St., Philadelphia 8, Pa.
●Johnson Corp., The, 806 Wood St., Three Rivers, Mich.
Johnson Gas Appliance Co., 520 "E" Ave., N. W., Cedar Rapids, Ia.
Johnson Heater Corp., 12 Newhall Ave., Saugas, Mass.
Johnson Machine Works, 619 Menomonie St., Eau Claire, Wis.
Johnson Mfg. Co., Inc., Mt. Vernon, Ia.
●Johnson Service Co., 507 E. Michigan St., Milwaukee 2, Wis.
Johnston Bros., Inc., Ferrysburg, Mich.
Johnston & Chapman Co., 2925 Carroll Ave., Chicago 12, Ill.
Johnston & Jennings Co., 877 Addison Rd., Cleveland 14, O.
Johnston Foil Mfg. Co., 6100 S. Broadway, St. Louis 11, Mo.
Jones Foundry & Machine Co., W. A., 4401 Roosevelt Rd., Chicago 24, Ill.
Jones & Laughlin Steel Corp., Third Ave. & Ross St., Pittsburgh 30, Pa.
Jordan & Co., Inc., Paul R., 311 E. South St., Indianapolis 4, Ind.
●Joy Mfg. Co., Henry W., Dept. 20, Oliver Bldg., Pittsburgh 22, Pa.
Justrite Mfg. Co., 2061 N. Southport Ave., Chicago, Ill.
Justus Steam Trap Co., Napanoch, N. Y.

K

Kainer & Co., 763 W. Lexington St., Chicago 7, Ill.
●Kaiser Aluminum & Chemical Corp., 1924 Broadway, Oakland 12, Calif.
Kaiser Co., E. B., 625 Webster Ave., Chicago 14, Ill.
Kaiser Co., H. S., 3336 Franklin Blvd., Chicago, Ill.
Kane Mfg. Corp., Kane, Pa.
Kates Co., W. A., 430 Waukegan Rd., Deerfield, Ill.
Kauffman Air Conditioning Corp., 4505 Olive St., St. Louis 8, Mo.
Kaufman Co., H. J., The, 13215 Roselawn Ave., Detroit 4, Mich.
Kaye & McDonald, Inc., 11-15 Central Ave., West Orange, N. J.
Kaylo Div., Owens-Illinois Glass Co., Box 1035, Toledo 1, O.
Keasbey Co., Robert A., 139-149 W. 19th St., New York, N. Y.
●Keasbey & Mattison Co., Butler Ave., Ambler, Pa.
Keckley Co., O. C., 400 W. Madison St., Chicago 6, Ill.
Keeler Co., E., 238 West St., Williamsport 3, Pa.
Keeney Mfg. Co., Main St., Newington 11, Conn.
Kehm Corp., The, 135 S. La Salle St., Chicago 3, Ill.
Keller Tool Co., P. O. Box 268, Grand Haven, Mich.
Kellogg Co., M. W., The, 225 Broadway, New York 7, N. Y.
Kelley Koett Mfg. Co., The, 212 W. 4th St., Covington, Ky.
Kelvinator Div., Nash-Kelvinator Corp., 14250 Plymouth Rd., Detroit 32, Mich.
Kenite Laboratory, Inc., 100 Kings Rd., P. O. Box 268, Madison, N. J.
●Kennard Corp., 1819 S. Hanley Rd., St. Louis 17, Mo.
Kennedy Valve Mfg. Co., The, Elmira, N. Y.
Kenney Co., L. C., 5909 S. Western Ave., Chicago 36, Ill.
Kensico Tube Co., Mt. Kisco, N. Y.
Kerentoff, G. L., 2218 Reading Rd., Cincinnati 2, O.
Kern Co., John A., 224 N. Loomis St., Chicago 7, Ill.
Kernchen Co., 333 N. Michigan, Chicago, Ill.
Kerotest Mfg. Co., 2525 Liberty Ave., Pittsburgh 22, Pa.
Kester Solder Co., 4201 Wrightwood Ave., Chicago 39, Ill.
●Kewanee Boiler Corp., Franklin St. and "Q" Tracks, Kewanee, Ill.
●Key Co., 2617 McCasland, East St. Louis, Ill.
Keystone Asphalt Products Co., 43 E. Ohio St., Chicago 11, Ill.
Keystone Carbon Co., Inc., 1935 State St., St. Marys, Pa.
Kidder Mfg. Co., Inc., J. F., 426 Colchester Ave., Burlington, Vt.
Kieley & Mueller, Inc., 2015 43rd St., North Bergen, N. J.
Kilbury Mfg. Co., Inc., 14259 Hawthorne Blvd., Lawndale, Calif.
Kimberly-Clark Corp., Neenah, Wis.
Kindl-Air Corp., 1480 W. 112th St., Cleveland, Ohio
King Co., The, 928 N. Cedar St., Owatonna, Minn.
King Engineering Corp., 945 Willard Ave., Ann Arbor, Mich.
King Union Co., Inc., Hillsgrove, R. I.
Kingsford Foundry & Machine Wks., 264 W. Second St., Oswego, N. Y.
Kingston Products Corp., 1415 N. Webster, Kokomo, Ind.
Kinney Mfg. Co., 3529 Washington St., Boston 30, Mass.
Kirk & Blum Mfg. Co., 2838-52 Spring Grove Ave., Cincinnati, O.
Kisco Boiler & Engineering Co., 2414 Dekalb St., St. Louis 4, Mo.
Klauer Mfg. Co., 9th and Washington Sts., Dubuque, Ia.
Kleenaire Corp., 409 Jefferson St., Stevens Point, Wis.
Kleen-Heet, Inc., 1823 Carroll Ave., Chicago 12, Ill.
Klenk's Aviation Snips, 107 E. 5th St., Wilmington, Del.
Kling Bros., Engineering Works, 1320 N. Kostner Ave., Chicago 51, Ill.
Klingerit. Inc., 16-22 Hudson St., New York 13, N. Y.
●Klipfel Valves, Inc., Div. of Hamilton-Thomas Corp., 1001 Laurel Ave., Hamilton, O.

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Klomparens Lock-Joint Mfg. Co., Inc., 4600 Bowen Rd., S. E., Washington 19, D. C.
Kluegel & Co., E., 187 W. Kellogg Blvd., St. Paul, Minn.
Knapp Bros. Mfg. Co. Inc., P. O. Box 7, Cincinnati 36, Ohio
Knight, Maurice A., Kelly Ave., Akron 9, O.
Knowles Mushroom Ventilator Co., 583 Upper Mountain Ave., Upper Montclair, N. J.
●Knuth Engineering Co., 2617 N. St. Louis, Chicago, Ill.
Kol-Master Corp., 161 Walberg St., Oregon, Ill.
Kold-Hold Mfg. Co., Lansing 4, Mich.
Kool-Sleep, Inc.. Cambridge, O.
Kopperman & Sons, Joseph, 316 New St., Philadelphia 6, Pa.
Koppers Co., Inc., Koppers Bldg., Pittsburgh 19, Pa.
Korfund Co., Inc., 48-01-F 32nd Pl., Long Island City 1, N. Y.
Koven & Bro., L. O., Inc., 154 Ogden Ave., Jersey City 7, N. J.
Kraissl Co., Inc., The, Terhune and Williams Aves., Hackensack, N. J.
●Kramer Trenton Co., N. Olden & Bruening Aves., Trenton 5, N. J.
Kraus Co., Walter S., 48-02 43rd St., Woodside, L. I., N. Y.
Krehbiel Co., J. H., 425 N. Crawford Ave., Chicago, Ill.
●Kritzer Radiant Coils, Inc., 2901 W. Lawrence Ave., Chicago 25, Ill.
Krueger Sentry Gauge Co., 1056 W. Mason St., Green Bay, Wis.
Kuhns Bros. Co., 1800 McCall St., Dayton 8, O.
Kunkle Valve Co., 121 S. Clinton St., Ft. Wayne 2, Ind.
Kwikon Co., 1850 W. Washington, Chicago 12, Ill.
Kynex Co., 21 West St., New York 6, N. Y.

L

LaBour Co., Inc., The, 1301 Sterling Ave., Elkhart, Ind.
Laclede-Christy Co., 411 N. Seventh St., St. Louis 1, Mo.
Laclede Steel Co., Arcade Bldg., Rm. 1317, St. Louis 1, Mo.
Laclede Stoker Co., 4438 Hunt Ave., St. Louis 10, Mo.
La Crosse Steel Roofing & Corrugating Co., 227 Jay St., La Crosse, Wis.
●Ladish Co., 5300 S. Packard Ave., Cudahy, Wis. (Milwaukee Suburb).
Lake Chemical Co., 3052 W. Carroll Ave., Chicago 12, Ill.
Lamb Electric Co., Kent, O.
Lammert & Mann Co., Wood & Walnut Sts., Chicago 12, Ill.
Lamson Corp., Blower Div., Syracuse 1, N. Y.
Lamson & Sessions Co., 1971 W. 85th St., Cleveland, O.
Lancaster Heat Transfer Co., Inc., 123 DeKalb Ave., Brooklyn, N. Y.
Landis & Gyr, Inc., 104 Fifth Ave., New York 11, N. Y.
Landis Machine Co., Inc., Fifth and Church Sts., Waynesboro, Pa.
Larkin Packer Co., 6200 Maple Ave., St. Louis 14, Mo.
Larkin Coils, Inc., 519 Memorial Dr., S. E., Atlanta 1, Ga.
Lastik Products Co., Inc., 203 Iroquois Bldg., Pittsburgh 13, Pa.
Lau Blower Co., 2001 Home Ave., Dayton 7, O.
Lawler Automatic Controls, Inc., 453 N. MacQuesten Pkwy., Mount Vernon, N. Y.
Lawrence Pump & Engine Co., P. O. Box 70, Lawrence, Mass.
Layne & Bowler, Inc., Box No. 6815, Hollywood Sta., Memphis 8, Tenn.
Leach Relay Co., 5919 Avalon Blvd., Los Angeles 3, Calif.
Lead Lined Iron Pipe Co., 1 Broadway, Wakefield, Mass.
Leahy Mfg. Co., Los Angeles, Calif.
Leavitt Machine Co., East River St., Orange, Mass.
Lecourtenay Co., 5 Maine St., Newark 5, N. J.
Lee Co., K. O., Aberdeen, S. D.
Lee Engineering Co., 95 River St., Hoboken, N. J.
Lee & Son, Thomas, 128-132 W. Second St., Cincinnati 2, O.
Leeds & Northrup Co., 4970 Stenton Ave., Philadelphia 44, Pa.
Lees, John, Div., The, Serrick Corp., Batavia St. and Kilgore Ave., Muncie, Ind.
Leffel & Co., James, 426 East St., Springfield, O.
Lehigh Fan & Blower Co., Front & Linden Sts., Allentown, Pa.
Lehigh Mfg. Co., Div. of Lehigh Foundries, Inc., Lancaster, Pa.
Leinweber Aluminum Nozzles, 8448 Crandon, Chicago, Ill.
Leland Electric Co., 1501 Webster St., Dayton 1, O.
Lenk Mfg. Co., 30 Cummington St., Boston 15, Mass.
Lennox Furnace Co., Marshalltown, Ia., Syracuse, N. Y., and Columbus, Ohio
Leonard Valve Co., 1360 Elmwood Ave., Cranston 9, R. I.
●Leslie Co., 237 Grant Ave., Lyndhurst, N. J.
Leslie Welding Co., 2943 Carroll Ave., Chicago 12, Ill.
Levow, David, 308 W. 20th St., New York 11, N. Y.
Lewellen Mfg. Co., Columbus, Ind.
Lewin-Mathes Co., Lewin Metals Div., 1111 Chouteau Ave., St. Louis 2, Mo.
Lewis & Co., Inc., Chas. S., 2207 Pine St., St. Louis 3, Mo.
Lewis & Co., Joseph E., 1319 Carroll St., Baltimore, Md.
Leyman Mfg. Corp., John H. McGowan Co. Div., 1416 First National Bank Bldg., Cincinnati 2, O.
Libbey-Owens-Ford Glass Co., Nicholas Bldg., Toledo 3, O.
Libert Machine Co., 324 N. Roosevelt St., Green Bay, Wis.
Lieblich Oil Burner Inc., 36 W. 66th St., New York, N. Y.
Lientz Co., B. P., P. O. Box 2275, Kansas City, Mo.
●Lilie-Hoffmann Cooling Towers, Inc., 4239 Duncan Ave., St. Louis 10, Mo.
Lima Electric Motor Co., The, Lima, O.
Lima Register Co., The, 651 N. Baxter St., Lima, O.
Lincoln Electric Co., The, 12818 Coit Rd., Cleveland 1, O.
Linde Air Products Co., The, Unit of Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Lindsay Structure, Inc., 5000 W. Dempster St., Skokie, Ill.
Lindy Heaters, Inc., 2370 Hoffman St., New York 57, N. Y.
Linear Incorporated, N. W. Cor. State Rd. & Levick St., Philadelphia 35, Pa.
Link-Belt Co., 307 N. Michigan Ave., Chicago 1; 300 W. Pershing Rd., Chicago 9, Ill., 519 N. Holmes Ave. and 220 S. Belmont Ave., Indianapolis 6, Ind., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.
Lintern Co., 60 Lincoln Ave., Berea, O.
Liquid Carbonic Corp., 3100 S. Kedzie Ave., Chicago 23, Ill.
Liquid Conditioning Corp., Sub. of Cochrane Corp., 17th St. below Alleghany Ave., Philadelphia 32, Pa.
Liquidepth Indicators, Inc., 1 Star Square, Long Island City 1, N. Y.
Liquidometer Corp., 37-15 Skillman Ave., Long Island City 1, N. Y.
Lissberger & Son, Inc., Marks, 23-01 Borden Ave., Long Island City, N. Y.
Lithgow Corp., 333 W. 40th Pl., Chicago 9, Ill.
●Little Giant Vaporizer Co., Inc., 5105 Classen Blvd., P. O. Box 3535, Oklahoma City 6, Okla.
Little Mfg. Co., M. S., 151 New Park Ave., Hartford 6, Conn.
Littleford Bros., Inc., 453 E. Pearl St., Cincinnati 2, O.
Livingstone Engineering Co., 100 Grove St., Worcester 5, Mass.
Locke Regulator Co., Walter and Osborne Sts., Salem, Mass.
Lockformer Co., The, 4615 W. Roosevelt Rd., Chicago 50, Ill.
Lockjoint Wood Products Co., 1114 S. Sante Fe, Wichita 11, Kan.
Locknut Corp. of America, 3403 W. 47th St., Chicago 32, Ill.
Lockport Cotton Batting Co., Lockport, N. Y.
Logan Engineering Co., Lawrence & Lamon Ave., Chicago 30, Ill.
Lonergan Co., J. E., 2nd and Race Sts., Philadelphia 6, Pa.
Long Mfg., Div. Borg-Warner Corp., 12501 Dequindre St., Detroit, Mich.
Lookout Boiler & Mfg. Co., Compress St. & Mfrs. Rd., Chattanooga 1, Tenn.
Lord Mfg. Co., 1635 W. 12th St., Erie, Pa.
Louisville Drying Machine Div., General American Transportation Corp., Hoffman Bldg., 4th & Market Sts., Louisville, Ky.
Lovejoy Flexible Coupling Co., 5081 W. Lake St., Chicago 44, Ill.
Lowell Wrench Co., 54 Commercial St., Worcester 8, Mass.
Loyal Knight Stokers, Inc., 800 Scheel St., Belleville, Ill.
Ludlow Valve Mfg. Co., Inc., Foot of Adams St., Troy, N. Y.
Lufkin Rule Co., Saginaw, Mich.
Lukens Steel Co. and Divisions, 308 S. First Ave., Coatesville, Pa.
Lumm Co., A. H., 2512 Albion St., Toledo 6, O.
Lumsden & Van Stone, Div. of Midwest Piping & Supply Co., 426 First St., South Boston 27, Mass.
Lunkenheimer Co., Waverly & Beekman Sts., Cincinnati 14, O.
Lustra Corp. of America, 36 Washington St., Brooklyn, N. Y.
Luzerne Rubber Co., Muirhead Ave., Trenton 9, N. J.
Lynch Mfg. Corp., 3600 Summit St., Toledo 1, O.
Lynchburg Foundry Co., Peoples Bank Bldg., Lynchburg, Va.
Lyon, Conklin & Co., Inc., McComas & Race Sts., Baltimore 30, Md.

M

M B Mfg. Co., Inc., The, 1060 State St., New Haven 11, Conn.
M-M-A, Inc., Wabank Rd., Lancaster, Pa.
Maas & Waldstein Co., 438 Riverside Ave., Newark 4, N. J.
MacDermid Chemical Co., Box 1041, Bristol, Conn.
Macksons Co., 125 Cedar St., New York 6, N. Y.
Madden & Co., P. E., 352 W. Walton Ave., Chicago, Ill.
Madden Brass Products Co., The, 1111 N. Franklin St., Chicago 10, Ill.
Mac-Lean-Fogg Lock Nut Co., 5535 N. Wolcott Ave., Chicago 40, Ill.
MaGirl Foundry & Furnace Co., 413 E. Oakland Ave., Bloomington, Ill.
Magnetrol, Inc., 2110 S. Marshall Blvd., Chicago 23, Ill.
MagniLastic Div., Cook Electric Co., 2700 Southport Ave., Chicago 14, Ill.
Magnode Products, Inc., 79 Clifton Pl., Brooklyn 5, N.Y.
Mahon Co., R. C., 8650 Mt. Elliott Ave., Detroit 11, Mich.
Mahr Mfg. Co., Div. of Diamond Iron Wks., Inc., 1728 Second St. N., Minneapolis 11, Minn.
●Maid-O'-Mist, Inc., 3217 N. Pulaski Rd., Chicago 41, Ill.
Maintenance Engineering Corp., 3611 Clinton Dr., Houston, Tex.
Majot Automatic Machine Co., Inc., 88 Main St., East Orange, N. J.
Mall Tool Co., 7740 South Chicago Ave., Chicago 19, Ill.
Malleable Iron Fittings Co., Branford, Conn.
Mallory Sales Co., 13904 Lincoln Ave., Dolton, Ill.
Manhattan Perforated Metal Co., Inc., 43-17 37th St., Long Island City 1, N. Y.
Manheim Mfg. & Belting Co., Manheim, Pa.
Manitowoc Engineering Wks., 16th & The River, Manitowoc, Wis.
Manning, Maxwell & Moore, Inc., Bridgeport 2, Conn.
Mansfield & Green, 1051 Power Ave., Cleveland 14, O.
Manufacturers Machine Co., Railroad Ave., North Andover, Mass.
Maplewood Machinery Co., Inc., 2634 Fullerton Ave., Chicago 47, Ill.
Marathon Electric Mfg. Corp., Cherry and Randolph Sts., P. O. Box 630, Wausau, Wis.
Marble-Card Electric Co., Gladstone, Mich.
Marco Co., Inc., 3rd & Church Sts., Wilmington 50, Del.
Marine & Industrial Products Co., 3731 Filbert St., Philadelphia 4, Pa.
Marion Machine Foundry & Supply Co., Marion, Ind.
Marks Bros. Co., 151 Hallett St., Boston 24, Mass.
●Marley Co., Inc., The, 3001 Fairfax Rd., Kansas City 15, Kan.
Marlin-Rockwell Corp., Jamestown, N. Y.
●Marlo Coil Co., 6135 Manchester Rd., St. Louis 10, Mo.
Marlow Pumps, Ridgewood, N. J.
Marman Products Co., Inc., 940 W. Florence Ave., Inglewood, Calif.
Marquette Mfg. Co., 401 Johnson St., Minneapolis, Minn.
●Marsh Corp., Jas. P., 3501 Howard St., Skokie, Ill.
Marsh Valve Co., 4th St., & Brigham Rd., Dunkirk, N. Y.

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Marshalltown Mfg. Co., 901 E. Nevada, Marshalltown, Ia.
Martens & Stormoen, 15 Hathaway St., Boston 10, Mass.
Martin Co., Inc., J. O., 637 Minna St., San Francisco 3, Calif.
Martin Fan & Blower Co., 4634 W. 21st Pl., Chicago 50, Ill.
Martin & Sons, H. P., 801 W. 12th St., Owensboro, Ky.
Martin-Quaid Co., 1815 W. Sedgley Ave., Philadelphia 32, Pa.
Martocello & Co., Jos. A., 229 N. 13th St., Philadelphia 7, Pa.
Masonite Corp., 111 W. Washington St., Chicago 2, Ill.
Mason-Neilan Regulator Co., 1190 Adams St., Boston 24, Mass.
Master Control Co., 3291 Manchester Rd., Akron, O.
Master Electric Co., 126 Davis Ave., Dayton 1, O.
Master Mechanics Co., 2097 Columbus, Cleveland, O.
Matthiessen & Hegeler Zinc Co., 9th & Sterling Sts., La Salle, Ill.
Maurath, Inc., 21800 Miles Ave., Cleveland 22, O.
Maurey Mfg. Corp., 2911 S. Wabash Ave., Chicago 16, Ill.
May Oil Burner Div., Gerotor May Corp., Maryland Ave. and Oliver, Baltimore 3, Md.
Mayne Products Co., 324 Harries Bldg., Dayton 2, O.
Mayson Mfg. Co., 4332 Horatio St., Detroit 10, Mich.
Maysteel Products, Inc., 740 N. Plankinton, Milwaukee 3, Wis.
McAlear Mfg. Co., 1921 S. Western Ave., Chicago 8, Ill.
McAuley Trap Co., 405 Penn Ave., Pittsburgh 22, Pa.
●McCord Corp., 2587 E. Grand Blvd., Detroit 11, Mich.
McCorkle Co., D. H., 6th & Bancroft Way, Berkeley 2, Calif.
●McDonnell & Miller, Inc., 3500 N. Spaulding Ave., Chicago 18, Ill.
McIntire Connector Co., 263 Jefferson St., Newark 5, N. J.
McKay Co., 1005 Liberty Ave., Pittsburgh 22, Pa.
McLarty Systems, 205 W. Michigan Ave., Battle Creek, Mich.
McLeod & Henry Co., Inc., Troy, N. Y.
McNeill Engineering Co., 4057 W. Van Buren St., Chicago 24, Ill.
McPherson Furnace & Supply Co., 1805 N. E. Second Ave., Portland 12, Ore.
McQuay, Inc., 1600 Broadway, N. E., Minneapolis 13, Minn.
McQuay-Norris Mfg. Co., Southwest Ave. at Marconi, St. Louis 10, Mo.
McRae Valve Co., 620 S. Main St., Los Angeles, Calif.
McRay Products Co., 950 Mission St., South Pasadena 1, Calif.
McWane Cast Iron Pipe Co., 1201 Vanderbilt Rd., Birmingham 2, Ala.
Mears-Kane-Ofeldt, Inc., P.O. Box 223, Bridgeport, Pa.
●Mechanical Industries Production Co., 217-223 Ash St., Akron 3, O.
Mechanical Products Corp., 168 N. Ogden Ave., Chicago 7, Ill.
Meco, Inc., 4101 S. E. 26th Ave., Portland 2, Ore.
Medart Co., 100 Potomac St., St. Louis 18, Mo.
Meier Electric & Machine Co., Inc., 3525 E. Washington St., Indianapolis 7, Ind.
Mel-Gauge Co., Crest Ave., East Haven, Conn.
Mel Products Co., The, 554 Chapel St., New Haven, Conn.
Meletron Corp., 950 N. Highland Ave., Los Angeles 38, Calif.
Mellish & Murray Co., 1715 Carroll Ave., Chicago 12, Ill.
Merchant & Evans Co., 2035 Washington Ave., Philadelphia 46, Pa.
●Mercoid Corp., The, 4201 Belmont Ave., Chicago 41, Ill.
Mercontrol Inc., 278 Pearl St., New York 7, N. Y.
Mercury Clutch Div., Automatic Steel Products, Inc., Canton 6, O.
Meriam Instrument Co., The, 10920 Madison Ave., Cleveland 2, O.
Mesker Steel Corp., Geo. L., 400 N. W. First St., Evansville 8, Ind.
Metal Carrier Corp., Grand Rapids, Mich.
Metal & Thermit Corp., 100 E. 42nd St., New York 17, N. Y.
Metallo Gasket Co., 16 Bethany St., New Brunswick, N. J.
Metropolitan Refining Co., Inc., 50-23 Twenty-Third St., Long Island City 1, N. Y.
●Mettler Co., Inc., The, 4366 Worth St., Los Angeles 16, Calif.
Meyer & Bro. Co., F., 308 S. Commercial St., Peoria 2, Ill.
Meyer Furnace Co., The, P. O. Box 989, Peoria 1, Ill.
Meyer Mfg. Co., 2536 Fourteenth St., Detroit 16, Mich.
Meyer & Wenthe, Inc., 30 S. Jefferson St., Chicago, Ill.
Michigan Pipe Co., 506 Phoenix Bldg., Bay City, Mich.
Micro Metallic Corp., 193 Bradford St., Brooklyn 7, N. Y.
Micro Products Co., 20 N. Wacker Dr., Chicago 6, Ill.
Micro Switch Div. of Minneapolis-Honeywell Regulator Co., 1 E. Spring St., Freeport, Ill.
Midco Register Corp., 1059 Grand Ave., St. Paul, Minn.
Mid-Continent Metal Products Co., 1960 Clybourn Ave., Chicago 14, Ill.
Midland Paint & Varnish Co., 3802 E. 91st St., Cleveland 5, O.
Mid-States Equipment Co., 2429 S. Michigan Ave., Chicago 16, Ill.
Mid-States Welder Mfg. Co., 6025 S. Ashland Ave., Chicago 36, Ill.
Midwest Automatic Control Co., 510 Third St., Des Moines, Ia.
●Midwest Piping & Supply Co., Inc., 1415 S. Second St., St. Louis 4, Mo.
Midwest Products Co., Port Byron, Ill.
Miller Electric Mfg. Co., Inc., 718 S. Bounds St., Appleton, Wis.
Miller-Harris Instrument Co., 836 N. 4th St., Milwaukee 3, Wis.
Millers Falls Co., 57 Wells St., Greenfield, Mass.
Mills Corp., Elmer E., 153-159 W. Huron St., Chicago 10, Ill.
Mills Industries, Inc., 4100 W. Fullerton Ave., Chicago 39, Ill.
Milton Equipment Co., N. E. Cor. 4th Race St., Philadelphia 6, Pa.
Milton Roy Co., 1371 E. Mermaid Ave., Philadelphia 18, Pa.
Milwaukee Gas Specialty Co., P. O. Box 461, Milwaukee, Wis.
Milwaukee Valve Co., S. Burrell St. at E. Hayes Ave., Milwaukee 7, Wis.
Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa.
Mineral Insulation Co., 103rd & Southwest Highway, Chicago Ridge, Ill.
Minerallac Electric Co., 25 N. Peoria St., Chicago 7, Ill.
Minimite Co., 3700 W. Roosevelt Rd., Chicago 24, Ill.
●Minneapolis-Honeywell Regulator Co., 2641 4th Ave., S., Minneapolis 8, Minn.
Minneapolis-Honeywell Regulator Co., Industrial Div., Wayne & Windrim Aves., Philadelphia 44, Pa.
Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul, Minn.
Minn-Kota Foundry & Mfg. Co., P. O. Box 822, Fargo, N. D.
●Miracle Adhesives Corp., 214 E. 53rd St., New York 22, N. Y.
Mir-O-Col Alloy Co., Inc., 312 North Ave., 21, Los Angeles 31, Calif.
Misener Mfg. Co., Inc., 200-8 Walton St., Syracuse 2, N. Y.
Mission Appliance Corp., 12611 Crenshaw Blvd., Hawthorne, Calif.
Mississippi Glass Co., 200 Fifth Ave., New York 10, N. Y.
Mitchell & Co., Inc., W. K., 29th & Ellsworth, Philadelphia 46, Pa.
Mitchell Mfg. Co., 2525 N. Clybourn Ave., Chicago, Ill.
Modern Engineering Co., 3411 Pine Blvd., St. Louis 3, Mo.
●Modine Mfg. Co., 1509 De Koven Ave., Racine, Wis.
Moeller Instrument Co., 132nd St. & 89th Ave., Richmond Hill 18, N. Y.
Moeschl-Edwards Corrugating Co., Inc., The, P. O. Box 1115, Cincinnati 1, O.
Monarch Mfg. Works, Inc., 2501 E. Ontario St., Philadelphia 34, Pa.
Monash-Younker Co., Inc., 1315 W. Congress St., Chicago 7, Ill.
Moncrief Furnace Co., P. O. Box 1673, Atlanta 1, Ga.
Monitor Controller Co., The, 51 Hayward St., Boston 84, Mass.
Monogram Products Co., Inc., 731 N. 35th St., Philadelphia 4, Pa.
Monsanto Chemical Co., 1700 S. Second St., St. Louis 4, Mo.
Monsanto Chemical Co., Merimac Div., Everett Sta., Boston 49, Mass.
Montag Stove & Furnace Wks., 2011 N. Columbia Blvd., Portland 3, Ore.
Montgomery Bros., 1122 Howard St., San Francisco, Calif.
Moore Inc., Goodloe E., 2811 N. Vermilion, Danville, Ill.
●Moore Co., The, 810 S. Missouri, Marceline, Mo.
Moore Products Co., H and Lycoming Sts., Philadelphia 24, Pa.
Moraine Products Div., General Motors Corp., Dayton 1, O.
Moran Flexible Joint Co., Inc., 217 W. Main St., Louisville, Ky.
Morehead Mfg. Co., 2455 W. Warren Ave., Detroit 8, Mich.
Moreheat Distribution Inc., 5608 Stewart Rd., Cincinnati 27, O.
Morey, Dan, Box 85, Los Angeles 35, Calif.
Morganite, Inc., Carbon Specialties Div., 3304 48th Ave., Long Island City 1, N. Y.
Morheat Corp., 700 E. Kalamazoo, Lansing, Mich.
Morris Coupling & Clamp Co., 12th and Factory Ave., Elwood City, Pa.
Morris Machine Wks., 50 E. Genesee St., Baldwinsville, N. Y.
Morrison Brothers Co., Dubuque, Ia.
Morrison Products, Inc., E. 168th St. and Waterloo Rd., Cleveland 10, O.
Morse Chain Co., 7601 Central Ave., Detroit 8, Mich.
Morse-Smith-Morse, Inc., 165 Dexter Ave., Watertown 72, Mass.
Mortell Co., J. W., Kankakee, Ill.
Motionair Co., 3319 E. Slauson Blvd., Los Angeles 11, Calif.
Mouat Vapor Heating Co., The, 1246-1254 W. 4th St., Cleveland 13, O.
Mt. Hawley Mfg. Co., Inc., Mt. Hawley Air Port, Peoria 4, Ill.
Mountain States Equipment Co., 1238 Speer Blvd., Denver 4, Colo.
●Muckle Mfg. Co., Owatonna 3, Minn.
●Mueller Brass Co., Port Huron, Mich.
Mueller Co., 512 W. Cerro Gordo St., Decatur, Ill.
●Mueller Furnace Co., L. J., 2005 W. Oklahoma Ave., Milwaukee 7. Wis.
Mueller Steam Specialty Co., Inc., 40-20 22nd St., Long Island City 1, N. Y.
Multi-Cell Sales Corp., 3420 Nicollet Ave., Minneapolis 8, Minn.
Multiplex Mfg. Co., Berwick, Pa.
●Multi-Vent Div., Pyle-National Co., The, 1373 Kostner Ave., Chicago 51, Ill.
Muncie Gear Wks., Inc., 700 N. Wysor, Muncie, Ind.
Mundet Cork Corp., 7101 Tonnelle Ave., North Bergen, N. J.
Mundt & Sons, Charles, 53 Fairmount Ave., Jersey City 4, N. J.
Munn & Steele, Inc., Castle Island Terminal, South Boston, Mass.
Munton Mfg. Co., 9400 Belmont Ave., Franklin Park, Ill.
Murray Iron Wks. Co., 1106 Washington St., Burlington, Ia.
Murray Mfg. Co., D. J., 1002-24 Third St., Wausau, Wis.
Myers & Bro. Co., F. E., The, Ashland, O.
Myers Electric Co., Inc., 209 First Ave., Pittsburgh 22, Pa.
Mystik Adhesive Products Div., Chicago Show Printing Co., 2635 N. Kildaire, Chicago 39, Ill.

N

●Nash Engineering Co., 307 Wilson Ave., South Norwalk, Conn.
Nason Co., 7663 Epworth Blvd., Detroit 4, Mich.
Nat Corp., 2710 McGee St., Kansas City 8, Mo.
National Acme Co., The, 170 E. 131st St., Cleveland 8, O.
National Air Conditioning Inc., Johnstown, Pa.
National Airoil Burner Co., Inc., 1284 E. Sedgley Ave., Philadelphia 34, Pa.
National Aluminate Corp., 6215 W. 66th Pl., Chicago 38, Ill.
National Aniline Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
National Carbon Co., 30 E. 42nd St., New York 17, N. Y.
National Cylinder Gas Co., 840 N. Michigan Ave., Chicago 11, Ill.
National Engineering & Mfg. Co., 519 Wyandotte, Kansas City 6, Mo.
National Engineering Products, Inc., Commerce and Savings Bldg., Washington, D. C.
National Gas Equipment Co., Inc., Terrell, Tex.
National Gypsum Co., Delaware Ave., Buffalo, N. Y.
●National Heater Co., 2182 Cleora Ave., St. Paul 4, Minn.
National Lead Co., 111 Broadway, New York 6, N. Y.
National Lock Co., Inc., 1902 Seventh St., Rockford, Ill.
National Metal Fabricators, 2138 S. Sawyer, Chicago 23, Ill.
National Meter Co., 4221 First Ave., Brooklyn 32, N. Y.

● Advertisement in this issue. See Index to Advertisers, page 1276

National Oil Burner Co. of N. Y. Inc., 614 Bergen St., Brooklyn, N. Y.
National Pipe Bending Co., 122 River St., New Haven 13, Conn.
National Pipe Coatings, Inc., 315 W. 9th St., Los Angeles 15, Calif.
National Radiator Co., The, 221 Central Ave., Johnstown, Pa.
National Steam Pump Co., 701 W. Johnson St., Upper Sandusky, O.
National Time & Signal Corp., 21800 Wyoming Ave., Detroit 20, Mich.
National Tube Co., United States Steel Corp., Subsidiary, Frick Bldg., Pittsburgh 30, Pa.
National Valve & Mfg. Co., 3101 Liberty Ave., Pittsburgh 1, Pa.
National Water Lift Inc., Kalamazoo, Mich.
Naugatuck Mfg. Co., Union City, Conn.
Naylor Pipe Co., 1251 E. 92nd St., Chicago 19, Ill.
Nebel Mfg. Co., P. O. Box 3942, Shaker Square Sta., Cleveland 20, O.
Neilson Chemical Co., 6564 Benson Ave., Detroit 7, Mich.
Nelson Chemical Pumps, Box 2235, Casper, Wyo.
●Nelson, Herman, Div., American Air Filter Co., Inc., 1824 Third Ave., Moline, Ill.
Nelson Mfg. Co., B. F., 401 Main St., N. E., Minneapolis 13, Minn.
Nelson Stud Welding, Div. of Morton Gregory Corp., Lorain, O.
Neptune Meter Co., 50 W. 50th St., New York 20, N. Y.
●Nesbitt, Inc., John J., State Rd. & Rhawn St., Philadelphia 36, Pa.
Nevinger Mfg. Co., Inc., Greenville, Ill.
New Albany Machine Mfg. Co., E. 10th & Water Sts., New Albany, Ind.
New Departure Div., General Motors Corp., Bristol, Conn.
New England Cooling Tower Co., 88 Broad St., Boston 10, Mass.
New Haven Copper Co., Seymour, Conn.
New Jersey Zinc Sales Co., Front & Fletcher Sts., New York 7, N. Y.
New York Air Valve Corp., 1850 Atlantic Ave., Brooklyn 33, N. Y.
●New York Blower Co., 3159 Shields Ave., Chicago 16, Ill.
New York Brass Foundry, 405 Broome St., New York, N. Y.
Newark Boiler Regulator Co., Inc., 15 Ward St., Bloomfield, N. J.
Newark Transformer Co., Linden & Park Ave., Linden, N. J.
Newark Wire Cloth Co., 351 Verona Ave., Newark 4, N. J.
Newcomb-Detroit Co., 5741 Russell St., Detroit 11, Mich.
●Newman Co., Inc., I. C., 30 E. 40th St., New York 16, N. Y.
Newport Steel Corp., Rolling Mill Div., Ninth & Lowell Sts., Newport, Ky.
●Niagara Blower Co., 405 Lexington Ave., Room 3117, New York 17, N. Y.
Niagara Industrial Corp., 20 Vesey St., New York 7, N. Y.
Niagara Machine & Tool Wks., 637-697 Northland Ave., Buffalo 11, N. Y.
Nice Ball Bearing Co., 30th and Hunting Park Ave., Philadelphia 40, Pa.
●Nicholson & Co., W. H., 198 Oregon St., Wilkes-Barre, Pa.
Nikoh Tube Co., 5001 S. Kedzie, Chicago 32, Ill.
Niles Rolling Mill Co., Niles, O.
Noera Mfg. Co., Div. Chase Brass & Copper Co., Waterbury 20, Conn.
Nooter Corp., 1400 S. Second St., St. Louis 4, Mo.
Nordstrom Valve Div., Rockwell Mfg. Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.
Norgren Co., C. A., 222 Sante Fe Dr., Denver 9, Colo.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
Norman Products Co., Inc., 1150 Chesapeake Ave., Columbus, O.
Norristown Magnesia & Asbestos Co., Washington St., Norristown, Pa.
North American Fibre Products Co., The, Standard Bldg., Cleveland 13, O.
North American Mfg. Co., 4455 E. 71st St., Cleveland, O.
North American Philips Co., Inc., 750 S. Fulton Ave., Mt. Vernon, N. Y.
North Penn Co., 38 E. 21st St., New York 10, N. Y.
Northern Blower Co., 6428 Barberton Ave., Cleveland 2, O.
Northern Equipment Div., Continental Foundry & Machine Co., 1945 Grove Drive, Erie 2, Pa.
Northern Indiana Brass Co., 935 Plum St., Elkhart, Ind.
Northern Steel & Stoker Corp., 3100 Prospect Rd., Peoria 4, Ill.
Northwest Heating, Inc., 1944 N. Lombard, Portland 3, Ore.
Northwest Lead Co., 2700 16th Ave., S. W., Seattle 4, Wash.
Norwalk Valve Co., South Norwalk, Conn.
Norwood Filtration Co., The, 380 Dwight St., Holyoke, Mass.
Nutmeg Chemical Co., 134 Haven St., New Haven, Conn.
Nu-Way Corp., The, 2416 4th Ave., Rock Island, Ill.
Nye Tool Co., 4120-30 Fullerton Ave., Chicago 39, Ill.

O

OPW Corp., 2735 Colerain Ave., Cincinnati 25, O.
Oakite Products, Inc., 22 Thames St., New York 6, N. Y.
Obear, E. L., 10224 S. Figueroa St., Los Angeles, Calif.
Oberdorfer Foundries, Inc., 3007 Thompson Rd., Syracuse, N. Y.
O'Brien Corp., The, South Bend 21, Ind.
O'Brien Industries, 84 Bishop St., Jersey City 4, N. J.
O'Brien Steam Specialty Co., Inc., 205 Harrison St., Syracuse 2, N. Y.
Octagon Ventilator Co., 5828-30 S. Oakley Ave., Chicago 36, Ill.
●Ohio Brass Co., 380 N. Main St., Mansfield, O.
Ohio Chemical & Mfg. Co., The, 1400 E. Washington, Madison, Wis.
Ohio Electric Mfg. Co., 5925 Maurice Ave., Cleveland 4, O.
Ohio Foundry & Mfg. Co., Penn R. R. & Slack St., Steubenville, O.
Ohio Injector Co., 275 Main St., Wadsworth, O.
Ohio Pipe Bending & Machine Co., 3900-3910 Trent Ave., Cleveland 9, O.
Ohio Products Co., 16113 Munn Rd., Cleveland 11, O.
Ohio Valley Hardware & Roofing Co., Evansville, Ind.
Ohl & Son, George A., 159 Oraton St., Newark, N. J.
Ohmlac Paint & Refining Co., Inc., 92 Liberty St., New York 6, N. Y.
Oil Equipment Mfg. Corp., 75 Brewster St., New Haven, Conn.
Olsen Testing Machine Co., Tinius, Easton Rd., Willow Grove, Pa.
●Olson & Co., Arthur A., Canfield, O.
O'Neil-Irwin Mfg. Co., 800 Jefferson, Lake City, Minn.
Orangeburg Mfg. Co., Orangeburg, N. Y.
Ormsby-Osterman, Inc., 3631 Cass Ave., St. Louis 13, Mo.
●Orr & Sembower, Inc., Box 1138, Reading, Pa.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Oster Mfg. Co., 2057 E. 61st Pl., Cleveland 3, O.
Ostlind Valve, Inc., 601 N. E. 28th Ave., Portland 12, Ore.
Overhead Heaters, Inc., 1354 Book Bldg., Detroit 26, Mich.
OverSpred Stoker Co., 77 Washington St., Suite 1702, Chicago 2, Ill.
●Owens-Corning Fiberglas Corp., 1911 Nicholas Bldg., Toledo 1, O.
Owens & Co., Inc., Henry, 51 Washington Ave., Cranston 7, R. I.
Ozalid Div. of General Aniline & Film Corp., 1505 Ansco Rd., Johnson City, N. Y.
Ozone Air Co., 1132 Division Ave., S., Grand Rapids 7, Mich.

P

Paasche Airbrush Co., 1909 Diversey Parkway, Chicago 14, Ill.
Pabco Products Inc., 475 Brannan St., San Francisco 19, Calif.
Pacific Lumber Co., The, 100 Bush St., San Francisco 4, Calif.
Pacific Machine & Iron Wks., Port of Tacoma Rd., Tacoma, Wash.
Pacific Mfg. Co., 7500 Stanton Ave., Cleveland 4, O.
Pacific Pumping Co., 9201 San Leandro Blvd., Oakland, Calif.
Pacific States Felt & Mfg. Co., Inc., 845 Howard St., San Francisco, Calif.
Pacific Steel Boiler Div., United States Radiator Corp., 300 Buhl Bldg., Detroit 31, Mich.
Pacific Tube Co., 5710 Smithway St., Los Angeles 22, Calif.
Packless Metal Products Corp., 31 Winthrop Ave., New Rochelle, N. Y.
Paddock Engineering Co. of Texas, 2607 Cedar Springs, Dallas, Tex.
Page Steel & Wire, Div. of American Chain & Cable Co., Inc., Monessen, Pa.
Paine Co., 2951 W. Carroll Ave., Chicago 12, Ill.
Pains Fireworks Display Co., Inc., 11 Park Pl., New York 7, N. Y.
Palmer Electric Co., 20 Sproat St., Detroit 1, Mich.
Palmer Mfg. Corp., 2200 W. Filmore St., Phoenix, Ariz.
Palmer Thermometers, Inc., 2501 Norwood Ave., Cincinnati (Norwood) 12, O.
Palnut Co., 106 Cordier St., Irvington, N. J.
Panelyte Div., St. Regis Paper Co., 230 Park Ave., New York 17, N. Y.
Pangborn Corp., 400 Pangborn Blvd., Hagerstown, Md.
Pan-L-Heat Corp., 2838 N. E. Columbia Blvd., Portland 11, Ore.
Paragon Electric Co., 1600 Twelfth St., Two Rivers, Wis.
Paragon-Revolute Corp., 61 South Ave., Rochester 4, N. Y.
Paramount Products Co., 545 Fifth Ave., New York, N. Y.
Parker Appliance Co., The, 17325 Euclid Ave., Cleveland 12, O.
Parker-Kalon Corp., 200 Varick St., New York 14, N. Y.
Parks-Cramer Co., P. O. Box 444, Fitchburg, Mass.
Patrol Valve Co., The, 2310 E. Superior Ave., Cleveland 14, O.
Patten Co., J. V., 500 De Kalb Ave., Sycamore, Ill.
Patterson-Ballagh Corp., 1900 E. 65th St., Los Angeles, Calif.
●Patterson-Kelley Co., Inc., The, 107 Warren St., East Stroudsburg, Pa.
Paul-Lewis Laboratories, Inc., 4253 N. Port Washington Rd., Milwaukee 12, Wis.
Paul Valve Corp., 683 Third Ave., New York 17, N. Y.
Payne Furnace Div., Affiliated Gas Equipment, Inc., 801 Royal Oaks Ave., Monrovia, Calif.
Peabody Engineering Corp., 580 Fifth Ave., New York 19, N. Y.
Pease Co., C. F., The, 2601 W. Irving Park Rd., Chicago 18, Ill.
Peck & Harvey, 5736 N. Western Ave., Chicago 45, Ill.
Peck, Stow & Wilcox Co., Center St., Southington, Conn.
Pecora Paint Co., Inc., 4th St., and Penna. R. R., Philadelphia 40, Pa.
Pedrick Tool & Machine Co., 3640 N. Lawrence St., Philadelphia 40, Pa.
Peer, Inc., 1440 Milton St., Benton Harbor, Mich.
Peerless of America, Inc., 2901 Lawrence Ave., Chicago 25, Ill.
Peerless Electric Co., 1401 W. Market St., Warren, O.
Peerless Pump Div., Food Machinery & Chemical Corp., 301 West Ave., 26, Los Angeles 31, Calif.
Peerless Unit Ventilation Co., Inc., 810 Union Ave., Bridgeport, Conn.
Penberthy Injector Co., 1242 Holden Ave., Detroit 2, Mich.
Penn Brass & Copper Co., 3800 W. 20th St., Erie, Pa.
●Penn Electric Switch Co., P. O. Box 556, Goshen, Ind.
Penn Galvanizing Co., 2201 E. Tioga St., Philadelphia 34, Pa.
Penn Industrial Instrument Corp., 4110 Haverford Ave., Philadelphia 4, Pa.
Penn Mfg. Corp. of Washington, Pa., 380 W. Chestnut St., P. O. Box 484, Washington, Pa.
Penn Ventilating Co., Goodman above Allegheny Ave., Philadelphia 40, Pa.
Pennsylvania Engineering Wks., 526 S. Jefferson St., New Castle, Pa.
Pennsylvania Flexible Metallic Tubing Co., 72nd St. & Powers Lane, Philadelphia 42, Pa.
Pennsylvania Forge Co., Milnor & Bleigh Sts., Philadelphia, Pa.
Pennsylvania Furnace & Iron Co., Warren, Pa.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia 7, Pa.
% Proportioneers, Inc. %, 381 Harris Ave., Providence 1, R. I.
Perfect Circle Corp., Hagerstown, Md.
Perfection Grate & Stoker Co., 4 Fisk Ave., Springfield 7, Mass.
Perfection Refrigeration Parts Co., Harvey, Ill.

● Advertisement in this issue. See Index to Advertisers, page [illegible]

● Perfex Corp., 500 W. Oklahoma Ave., Milwaukee 7, Wis.
Perkins Machine Co., 4 Perkins Ave., Warren, Mass.
Perkins & Son, Inc., B. F., Chicopee St., Holyoke, Mass.
Permatex Co., Inc., 1716-1720 Avenue Y, Brooklyn 35, N. Y.
Permutit Co., 330 W. 42nd St., New York 18, N. Y.
Perolin Co., Inc., 1112 W. 37th St., Chicago 9, Ill.
Peters-Dalton, Inc., 17900 Ryan Rd., Detroit 12, Mich.
Peterson Co., B. A., 300 W. R. R. Ave., Dowagiac, Mich.
Petroleum Heat & Power Co., Stamford, Conn.
Petrometer Corp., 1 Star Sq., Long Island City 1, N. Y.
Pfening Co., Fred D., The, 1075 W. 5th Ave., Columbus 8, O.
Phelps Dodge Copper Products Corp., British American Tube Div., 40 Wall St., New York 5, N. Y.
Phelps Mfg. Co., 715 Thomas St., Little Rock, Ark.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago 50, Ill.
Philadelphia Gear Works, Inc., Erie Ave. & G St., Philadelphia 34, Pa.
Philadelphia Pipe Bending Co., 4135-65 N. Fifth St., Philadelphia 40, Pa.
Philadelphia Thermometer Co., 6th & Cayuga St., Philadelphia 40, Pa.
Philco Corp., Tioga & C Sts., Philadelphia 34, Pa.
Phillips & Co., H. A., 3255 W. Carroll Ave., Chicago 24, Ill.
● Phillips Cooling Tower Co., Inc., 220 Dupont St., Brooklyn 22, N. Y.
Phoenix Brass Fittings Corp., Coit St. & Chancellor Ave., Irvington 11, N. J.
Phoenix Mfg. Co., Joliet, Ill.
Phoenix Ventilator Co., Inc., 1665 63rd St., Brooklyn, N. Y.
Photoswitch, Inc., 77 Broadway, Cambridge 42, Mass.
Photovolt Corp., 95 Madison Ave., New York 16, N. Y.
Pick Mfg. Co., West Bend, Wis.
Pierce Co., Wm. B., The, 277 Military Rd., Buffalo 7, N. Y.
Piezo Mfg. Corp., 110 E. 42nd St., New York 17, N. Y.
Pilley Brush Co., Fort Madison, Ia.
Pines Engineering Co., Inc., 601 Walnut St., Aurora, Ill.
Pioneer Pump & Mfg. Co., 19679 John R. St., Detroit 3, Mich.
Pioneer Roofing & Sheet Metal Co., 226 N. Main St., Muskogee, Okla.
Pioneer Tool Co., 1103 Wisconsin Ave., Racine, Wis.
Piping Specialties, Inc., 114 Liberty St., New York 6, N. Y.
Piston Ring Div., Koppers Co., Inc., Bush & Hamburg Sts., Baltimore 3, Md.
Pittsburgh Brass Mfg. Co., 3155 Penn Ave., Pittsburgh, Pa.
Pittsburgh Chemical Laboratories, Inc., 405 Penn Ave., Pittsburgh, Pa.
Pittsburgh Corning Corp., 307 4th Ave., Pittsburgh, Pa.
Pittsburgh Equitable Meter Div., Rockwell Mfg. Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.
Pittsburgh Lectrodryer Corp., 327 32nd St., Pittsburgh 30, Pa.
Pittsburgh Pipe Coil & Bending Co., 61 Bridge St., Etna Pittsburgh 23, Pa.
Pittsburgh Piping & Equipment Co., 10 43rd St., Pittsburgh 1, Pa.
Pittsburgh Plate Glass Co., 2000 Grant Bldg., Pittsburgh 19, Pa.
Pittsburgh Steel Co., Grant Bldg., Pittsburgh, Pa.
Pittsburgh Tube Co., 212 Wood St., Pittsburgh 22, Pa.
Pittsburgh Valve & Fittings Corp., Barberton, O.
Pittsburg Water Heater Co., Box 4452, Pittsburgh 5, Pa.
Plasteel Products Co., McAdams Ave., Washington, Pa.
Plastergon Wall Board Co., Philadelphia Ave., Buffalo 7, N. Y.
Plastic Products Co., 6475 Georgia Ave., Detroit 11, Mich.
Pleasantaire Corp., 734 15th St., Washington 5, D. C.
Plibrico Jointless Firebrick Co., 1800 Kingsbury St., Chicago 14, Ill.
Plumb Mfg. Co., 1925 Dwyer Ave., Utica 3, N. Y.
Plummer Spray Equipment Co., 700 Filmore St., Napoleon, O.
Plymouth Industries, Inc., 1932 Harrison Ave., Plymouth, Ind.
Poe Co., C. W., The, 10530 Wilbur Ave., Cleveland 6, O.
Pokorney Mfg. Co., 3117 Clybourn Ave., Chicago, Ill.
Polaire Cooler Co., Inc., 141 E. Jackson St., Phoenix, Ariz.
Polo Pump Co., Polo, Ill.
Polyken Industrial Tape Dept., Bauer & Black, Div. of the Kendall Co., 222 W. Adams St., Chicago 6, Ill.
Poole Foundry & Machine Co., 1700 Union Ave., Woodberry, Baltimore 11, Md.
Portable Electric Tools, Inc., 320 W. 83rd St., Chicago 20, Ill.
● Porter & Co., Inc., H. W., 825 Frelinghuysen Ave., Newark 5, N. J.
Positive Control Co., The, 2818 Spring Grove Ave., Cincinnati 25, O.
Potter & Brumfield Sales Co., Princeton, Ind.
Powder Power Tool Corp., Ft. of S. W. Woods St., P. O. Box 1610, Portland 7, Ore.
Powder Weld Process Co., The, 419 Kent Ave., Brooklyn, N. Y.
Power Engineering Co., 2632 S. Dearborn, Chicago 16, Ill.
Powell Co., Wm., The, 2525 Spring Grove Ave., Cincinnati 22, O.
Power Piping Div., Blaw Knox Co., 829 Beaver Ave., Pittsburgh 12, Pa.
● Powers Regulator Co., 2720 Greenview Ave., Chicago 14, Ill.
● Prat-Daniel Corp., 70 Water St., East Port Chester, Conn.
Precision Products, Inc., 516 S. Lansing, Tulsa, Okla.
Precision Scientific Co., 3737 Cortland St., Chicago 47, Ill.
Precision Thermometer & Instrument Co., 1506 Brandywine St., Philadelphia 30, Pa.
Precision Welder & Machine Co., 138 E. McMicken Ave., Cincinnati 10, O.
Preferred Utilities Mfg. Corp., 1860 Broadway, New York 23, N. Y.
Presstite Engineering Co., 3900 Chouteau St., St. Louis 10, Mo.
Pressure Products Corp., 140 N. Dearborn St., Chicago 2, Ill.
● Pritchard & Co., J. F., Equipment Div., 908 Grand Ave., Kansas City 6, Mo.
Proctor & Schwartz, Inc., 7th St. and Tabor Rd., Philadelphia 20, Pa.
Products Research Co., 634 S. Western Ave., Los Angeles 5, Calif.
● Propellair Div., Robbins & Myers Inc., 1345 Aitken Blvd., Springfield, O.
Proved Products Mfg. Co., Drawer 1190, San Fernando, Calif.
Prox Co., Inc., Frank, 1201 S. First St., Terre Haute, Ind.
Puhl & Hepper Mfg. Co., Inc., 6400 W. Florissant Ave., St. Louis 20, Mo.
Pur Air Div., American Solvent Recovery Corp., 8th & Cassady Aves., Columbus 3, O.
Pure Carbonic, Inc., Div. of Air Reduction Co., Inc., 60 E. 42nd St., New York 17, N. Y.
Pyle-National Co., The, 1373 N. Kostner Ave., Chicago 51, Ill.
Pyott Foundry & Machine Co., 328 N. Sangamon St., Chicago 7, Ill.
Pyrolite Products Co., 1221-1231 W. 74th St., Cleveland 2, O.
Pyrometer Instrument Co., Inc., The, Bergenfield, N. J.

Q

Q-P Mfg. Co., Needham Heights, Mass.
Quaker City Iron Wks., Allegheny & Tulip St., Philadelphia 34, Pa.
Quaker Rubber Corp., Comly & Milnor Sts., Philadelphia 24, Pa.
Quality Specialty Co., Inc., 211 N. 2nd St., Philadelphia 6, Pa.
Quickwork Div., Whiting Corp., Harvey, Ill.
Quigley Co., Inc., 527 Fifth Ave., New York 17, N. Y.
Quijada Tool Co., Inc., 5474-78 Alhambra Ave., Los Angeles 32, Calif.

R

R C S Tool Sales Corp., P. O. Box 1434, Joliet, Ill.
R-S Products Corp., Germantown Ave. at Wayne Junction, Philadelphia 44, Pa.
Radiant Baseboard Panels, Inc., 900 W. Main St., New Britain, Conn.
Radiant Devices, 4030 Chouteau Ave., St. Louis, Mo.
Radiant Heat Engineering, Inc., 1289 N. Fair Oaks, Pasadena 3, Calif.
Radiant Heat Sales Engrg. Co., 3841 Broadway, Gary, Ind.
Radiant Utilities Corp., 8817-18th Ave., Brooklyn 14, N. Y.
Radiator Specialty Co., 1700-1900 Dowd Rd., Charlotte 1, N. C.
Radiator Valve Co. of America, 428 S. 52nd St., Philadelphia 43, Pa.
Raisler Corp., Grimes Sprinkler Div., 129 Amsterdam Ave., New York 23, N. Y.
● Ramset Fasteners, Inc., 12117 Berea Rd., Cleveland 11, O.
Ramsey Chain Co., Inc., 1029 Broadway, Albany 1, N. Y.
Ramtite Co., The, 2563 W. 18th St., Chicago 8, Ill.
Ranco, Inc., 601 W. 5th Ave., Columbus 1, O.
Randall Graphite Bearings, Inc., 609 W. Lake St., Chicago 6, Ill.
Ravena Iron Co., Ravena, N. Y.
Rawplug Co., Inc., The, 271 Church St., New York 13, N. Y.
● Ray Oil Burner Co., 401-499 Bernal Ave., San Francisco 12, Calif.
Raybestos-Manhattan, Inc., 61 Willett St., Passaic, N. J.
Rayfield Co., C. L., 2010-18 S. Halsted St., Chicago 8, Ill.
Raymond Pulverizer Div., Combustion Engineering-Superheater, Inc., 1324 N. Branch St., Chicago, Ill.
Raytheon Mfg. Co., Commercial Products Div., Waltham 54, Mass.
● R-P & C Div., American Chain & Cable Co., Inc., Reading, Pa.
Reading Tube Corp., 36-12 47th Ave., Long Island City, N. Y.
Ready-Power Co., The, 11231 Freud Ave., Detroit 14, Mich.
Reco Products Div., Refrigeration Engineering Corp., 2020 Naudain St., Philadelphia, Pa.
Red Jacket Mfg. Co., Davenport, Ia.
Red Spot Electric Co., 7405 S. Tacoma Way. Tacoma 9, Wash.
Redmond Co., Inc., Owosso, Mich.
Reed Unit-Fans, Inc., 1001 St. Charles Ave., New Orleans 8, La.
Reeves Pully Co., H. P., Columbus, Ind.
Reflectal Corp., 155 E. 44th St., New York 17, N. Y.
Refinite Corp., P. O. Box 1312, Omaha 8, Neb.
Refractory & Insulation Corp., 120 Wall St., New York 5, N. Y.
Refrigeration Appliances, Inc., 917-923 W. Lake St., Chicago, Ill.
Refrigeration Economics Co., Inc., 1231 Tuscarawas E., Canton 2, O.
Refrigeration Engineering Inc., 7250 E. Slauson Ave., Los Angeles 22, Calif.
Rega Mfg. Co., 79 Mt. Hope Ave., Rochester 20, N. Y.
● Register & Grille Mfg. Co., Inc., 70 Berry St., Brooklyn 11, N. Y.
Reichert Float & Mfg. Co., 2238 Smead Ave., Toledo 6, O.
Reif-Rexoil, Inc., 27-41 Carroll St., Buffalo 3, N. Y.
Reilly Tar & Chemical Corp., 1615 Merchants Bank Bldg., Indianapolis 4, Ind.
Reiner & Campbell Co., Inc., 19 Euclid Ave., Newark 5, N. J.
● Reinhard Brothers Co., 11-17 S. 9th St., Minneapolis 2, Minn.
Reintjes Co., Geo. P., 2517-19 Jefferson St., Kansas City, Mo.
Reliable Metal Engineering Co., 4336-4358 S. Knox, Chicago, Ill.
Reliable Perforating Co., 2047 N. Wood St., Chicago, Ill.
Reliable Products Mfg. Co., 123 De Kalb Ave., Brooklyn, N. Y.
Reliance Automatic Lighting Co., 1929 Mead St., Racine, Wis.
Reliance Electric & Engineering Co., 1058 Ivanhoe Rd., Cleveland 10, O.
Reliance Gauge Column Co., 5902 Carnegie Ave., Cleveland 3, O.
Reliance Refrigerating Machine Co., 3401 N. Kedzie Ave., Chicago, Ill.
Remco, Inc., Zelienople, Pa.
Remington Air Conditioning Div., Remington Corp., Cortland, N. Y.
● Rempe Co., 342 N. Sacramento Blvd., Chicago 12, Ill.
Rensselaer Valve Co., Ontario St., Cohoes, N. Y.
Reps Tool Co., Inc., Box 5, Elmwood Branch, Hartford 10, Conn.
Republic Boiler Corp., 50 W. 50th St., New York, N. Y.
Republic Flow Meters Co., 2240 Diversey Pkwy., Chicago 47, Ill.
Republic Products Co., 7420 State Rd., Philadelphia, Pa.
Republic Rubber Div., Lee Rubber & Tire Corp., Youngstown, O.
Republic Steel Corp., Republic Bldg., Cleveland 1, O.
Republic Steel Corp., Bolt & Nut Div., 1970 Carter Rd., Cleveland 13, O.
Republic Steel Corp., Steel & Tubes Div., 224 E. 131st St., Cleveland 8, O.

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Research Corp., Chrysler Bldg., New York 17, N. Y.
●Research Products Corp., 1015 E. Washington Ave., Madison 10, Wis.
Resisto Pipe & Valve Co., 262 Bridge St., East Cambridge, Mass.
Resistoflex Corp., Belleville 9, N. J.
Reuland Electric Co., 3001 W. Mission Rd., Alhambra, Calif.
Revcor, 5201 N. Avondale Ave., Chicago 30, Ill.
●Revere Copper & Brass, Inc., 230 Park Ave., New York 17, N. Y.
Rex Clay Products Co., 14414 Dexter Blvd., Detroit, Mich.
Rex Welder & Engineering Co., 1910 Walnut, Kansas City 8, Mo.
Reynolds Electric Co., 3000 River Rd., River Grove, Ill.
Reynolds Mfg. Co., The, 412 Prospect St., N. E., Grand Rapids, Mich.
Reynolds Mfg. Co., Inc., Springfield, Mo.
Reynolds Metals Co., 2500 S. 3rd St., Louisville 1, Ky.
●Reznor Mfg. Co., Mercer 8, Pa.
Rheem Mfg. Co., 570 Lexington Ave., New York 22, N. Y.
Rhoads & Sons, J. E., 35 N. Sixth St., Philadelphia 6, Pa.
●Rhode Island Fittings Co., cor. Dexter & Waverly Sts., Providence, R. I.
Rhode Island Humidifier & Ventilating Co., 99 Chauncy St., Boston 11, Mass.
Rhodes, Inc., M. H., 30 Bartholomew Ave., Hartford, Conn.
Richmond Engineering Co., Inc., 7th and Hospital Sts., Richmond, Va.
Richmond Radiator Co., 19 E. 47th St., New York 17, N. Y.
Richmont, Inc., 2810 E. 11th St., Los Angeles 23, Calif.
●Ric-wiL Co., Union Commerce Bldg., Cleveland 14, O.
●Ridge Tool Co., Clark St., Elyria, O.
Rid-Sludge Div., Aulwood Mfg. Co., 77 Raymond Ave., St. Paul, Minn.
Riggin Metal Products, Inc., Box 267, Kankakee, Ill.
Riggio Co., Frank D., 38 Orient Way, Rutherford, N. J.
Rigidbilt Inc., 2850 W. Fulton St., Chicago 12, Ill.
Rigidized Metals Corp., 658 Ohio St., Buffalo 3, N. Y.
Riley Stoker Corp., 9 Neponset St., Worcester, Mass.
Rinehart Inc., 511-513 Main St., Richmond, Ind.
Ripley Co., Inc., Middleton, Conn.
Ripley Co., Inc., L-R Blower Div., Middletown, Conn.
Ritter Pattern & Casting Co., Inc., 232 Canal St., New York 13, N. Y.
Rittling Corp., The, Hamburg, N. Y.
Robbins & Myers, Inc., Lagonda Ave., Springfield, O.
Roberson Co., L. N., 1539 E. 103rd St., Seattle 55, Wash.
Robert Mfg. Co., 9035 Venice Blvd., Los Angeles 34, Calif.
Roberts-Gordon Appliance Corp., 44 Central Ave., Buffalo 6, N. Y.
Roberts Tube Works, 2500 Military Ave., Detroit 9, Mich.
Robertson Co., H. H., 2400 Farmers Bank Bldg., Pittsburgh 22, Pa.
Robertson Sons, Inc., M. F., Lansdowne, Pa.
Robinson Aviation, Inc., Teterboro Air Terminal, Teterboro, N. J.
Robinson Clay Product Co., The, 65 W. State St., Akron 9, O.
Robinson Industries, Coleman, Mich.
Rochester Lead Works, Inc., 380 Exchange St., Rochester 8, N. Y.
Rochester Mfg. Co., Inc., 63 Rockwood St., Rochester 10, N. Y.
Rock Fleece Co., 115 Durango St., El Paso, Tex.
Rock Island Register Co., 2435 Fifth Ave., Rock Island, Ill.
Rockford Screw Products Co., 2501 Ninth St., Rockford, Ill.
Rockwell Co., W. S., 200 Eliot St., Fairfield, Conn.
Rockwood Mfg. Co., Inc., 1801-2001 English Ave., Indianapolis 6, Ind.
Rockwood Sprinkler Co., 38 Harlow St., Worcester 5, Mass.
Roddick Tool Co., P. O. Box 109, Anaheim, Calif.
Rodwell Engineering & Sales Co., 4303 Dodge St., Omaha, Neb.
Roessing Mfg. Co., 1616 Noble St., Sharpsburg, Pittsburgh 15, Pa.
Roller Bearing Co. of America, Whitehead Rd., Trenton 3, N. J.
Rome-Turney Radiator Co., Canal St., Rome, N. Y.
Roots-Connersville Blower Corp., 900 W. Mount St., Connersville, Ind.
Roper Corp., Geo. D., Blackhawk Park Ave., Rockford, Ill.
Rosebraugh Co., W. W., 680 S. 17th St., Salem, Ore.
Rosedale Foundry & Machine Co., Columbus & Preble Aves., N. S., Pittsburgh, Pa.
Ross Engineering Corp., J. O., 444 Madison Ave., New York 22, N. Y.
Ross Heater & Mfg. Co., Inc., 1407 West Ave., Buffalo 13, N. Y.
Ross Sprinkler Co., 34 Roberts St., Pasadena 3, Calif.
Ross Valve Mfg. Co., Inc., 6 Oakwood Ave., Troy, N. Y.
Rotary Concrete Drill Co., 650 S. Arroyo Pkwy., Pasadena, Calif.
Rotary Mfg. Co., 5718 Long Beach Ave., Los Angeles, Calif.
Rotary Seal Co., 2020 N. Larrabee St., Chicago 14, Ill.
Roth Co., Roy E., 2484 4th Ave., Rock Island, Ill.
Roto-Beam, 1755 N. Keeler Ave., Chicago 39, Ill.
Rotometals, Inc., 980 Harrison St., San Francisco 7, Calif.
Rotor Corp., Miamisburg, O.
Royal Mfg. Corp., Waterloo, Ind.
Royal Ventilator Co., 415 Locust St., Philadelphia 6, Pa.
Royersford Foundry & Machine Co., Inc., 101-131 Main St., Royersford, Pa.
Roylyn, Inc., 716-718 W. Wilson Ave., Glendale 3, Calif.
Rubatex Div., Great American Industries, Inc., Bedford, Va.
Ruberoid Co., 500 Fifth Ave., New York 18, N. Y.
Ruby Chemical Co., 74 McDowell St., Columbus 8, O.
Ruemelin Mfg. Co., 3860 N. Palmer St., Milwaukee 12, Wis.
Ruggles-Klingemann Mfg. Co., 110 Tremont St., Boston, Mass.
●Rupright, Siegfried, Box 6795, Los Angeles 22, Calif.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Russell Co., F. C., The, 1100 Chester Ave., Cleveland 1, O.
●Russell Electric Co., 4501 S. Western Blvd., Chicago 9, Ill.
Russell Mfg. Co., John M., Box 246, Naugatuck, Conn.
Rust-Oleum Corp., 2425 Oakton St., Evanston, Ill.
Rutland Fire Clay Co., Curtis Ave., Rutland, Vt.
Ruud Mfg. Co., 2934 Smallman St., Pittsburgh 1, Pa.

S

●SKF Industries, Inc., Front St., & Erie Ave., Philadelphia 32, Pa.
S.O.S. Products Co., Inc., 282 Nassau Ave., Brooklyn, N. Y.
Sac Tool Mfg. Co., 1913 Washington Ave., St. Louis 3, Mo.
St. Clair Rubber Co., 440 E. Jefferson, Detroit, Mich.
St. Louis Blow Pipe & Heater Co., Inc., 1948 N. 9th St., St. Louis 6, Mo.
St. Louis Tool Co., 6100 Prescott St., St. Louis 15, Mo.
St. Paul Corrugating Co., S. Wabasha and Water Sts., St. Paul 1, Minn.
Sales & Co., Murray W., 801 W. Baltimore Ave., Detroit 2, Mich.
Salina Metal Products Co., 9th and Bishop, Salina, Kan.
Sall Bros. Co., 2320 Kishwaukee St., Rockford, Ill.
Sall Mountain Co., 176 W. Adams St., Chicago 3, Ill.
Salsbury Motors, Inc., Div., Wayne Mfg. Co., 1201 E. Lexington St., Pomona, Calif.
Sampsel Time Control, Inc., Spring Valley, Ill.
San Angelo Foundry & Machine Co., 1000 E. Upton, San Angelo, Tex.
Sandee Mfg. Co., 5050 W. Foster Ave., Chicago, Ill.
Sangamo Electric Co., 1301 N. 11th St., Springfield, Ill.
Santa Fe Tank & Tower Co., 5401 S. Boyle Ave., Los Angeles 11, Calif.
●Sarco Co., Inc., Empire State Bldg., New York 1, N. Y.
●Sarcotherm Controls, Inc., Empire State Bldg., New York 1, N. Y.
Sauereisen Cements Co., Sharpsburg Station, Pittsburgh 15, Pa.
Saunders Machine & Tool Corp., 25 Atherton St., Yonkers, N. Y.
Saverite Engineering Co., 1030 Willow Ave., Hoboken, N. J.
Scaife Co., 26 Ann St., Oakmont, Pa.
Schade Valve Mfg. Co., 2527 N. Bodine St., Philadelphia 33, Pa.
Schaible Co., The, 1086 Summer St., Cincinnati 4, O.
Schatz Mfg. Co., The, Fairview, Poughkeepsie, N. Y.
Schaub Engineering Co., Fred H., 2110 S. Marshall Blvd., Chicago 23, Ill.
Schecter Brothers Co., Hancock and Huntingdon Sts., Philadelphia 33, Pa.
Schieren Co., Chas. A., 30-38 Ferry St., New York 7, N. Y.
Schild Mfg. Co., 4107 N. 15th St., Milwaukee 9, Wis.
Schmieg Industries, 312-320 Piquette Ave., Detroit 2, Mich.
●Schnacke, Inc., 1016 E. Columbia St., Evansville, Ind.
Schneible Co., Claude B., 2827 25th St., Detroit 16, Mich.
Schoedinger, F. O., 322-358 Mt. Vernon Ave., Columbus 16, O.
Schramm, Inc., West Chester, Pa.
Schundler & Co., Inc., F. E., 45-15 Vernon Blvd., Long Island City, N. Y.
Schutte & Koerting Co., 12th and Thompson Sts., Philadelphia, Pa.
Schwitzer-Cummins Co., 1125 E. 22nd St., Indianapolis 7, Ind.
Sciaky Bros. Inc., 4915 W. 67th St., Chicago 38, Ill.
Scientiae Tool Co., 103 Pine, Dayton 2, O.
Scientific Instrument Co., 1041 Second Ave., Detroit 26, Mich.
Scott-Newcomb, Inc., 1922 Pine St., St. Louis, Mo.
Scott Valve Mfg. Co., 3963 McKinley Ave., Detroit 8, Mich.
Scovill Mfg. Co., Brass Goods Div., Waterville 14, Conn.
Scully Signal Co., 88 First St., Cambridge 41, Mass.
Sealed Power Corp., 500 Sanford St., Muskegon 61, Mich.
Sealol Corp., 45 Willard Ave., Providence 5, R. I.
Seamless Rubber Co., Industrial Tape Div., New Haven, Conn.
Seamlex Co., Inc., 41-23 24th St., Long Island City 1, N. Y.
Selas Corp. of America, Erie Ave. and D St., Philadelphia 34, Pa.
●Sellers Engineering Co., 4874-76 N. Clark St., Chicago 40, Ill.
Semet-Solvay Engineering Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Semler Co., Jeannette, Pa.
Sensenich Corp., Adjacent to Lancaster Municipal Airport, Lancaster, Pa.
Servel, Inc., Electric Refrigeration Div., 119 Morton Ave., Evansville 20, Ind.
Service To Industry, Box 133, West Hartford, Conn.
Shafer Bearing Corp., 801 Burlington Ave., Downers Grove, Ill.
Shakeproof, Inc., 2501 N. Keeler Ave., Chicago 39, Ill.
Shallcross Co., 48th and Grays Ferry Rd., Philadelphia 43, Pa.
Shallcross Controls, Inc., 2217-21 N. 31st St., Milwaukee 8, Wis.
Shank Co., Cyrus, 625 W. Jackson Blvd., Chicago 6, Ill.
Sharon Steel Corp., Sharon, Pa.
Shaw Co., Benjamin F., Second & Lombard Sts., Wilmington 99, Del.
Shaw-Kendall Engineering Co., 128 S. Superior St., Toledo 4, O.
Shaw-Perkins Mfg. Co., 201 E. Carson St., Pittsburgh 22, Pa.
Sheetlock Co., 4521 N. Clark St., Chicago, Ill.
Sheffler-Gross Co., Drexel Bldg., Philadelphia 6, Pa.
Shell Oil Co., Lubricants Dept., 50 W. 50th St., New York 20, N. Y.
Shephard Heater Co., Inc., 951 Sycamore St., Terre Haute, Ind.
Sherwin-Williams Co., The, 101 Prospect Ave., N. W., Cleveland, O.
Siemon & Co., 1817-19 Holmes St., Kansas City 8, Mo.
Sight Feed Generator Co., P. O. Box 38, West Alexandria, O.
Signal Electric Mfg. Co., Menominee, Mich.
Signal Indicator Co., 894 Broadway, New York 3, N. Y.
Sikes Co., S. R., 1028 S. Third St., Minneapolis 15, Minn.
Silvercote Products, Inc., 161 E. Erie St., Chicago 11, Ill.
Simplex Ceiling Corp., 552 W. 52nd St., New York 19, N. Y.
Simplex Heating Specialty Co., Inc., 954 Cabell St., Lynchburg, Va.
Simplex Mfg. Co., 128 N. Main St., Fond du Lac, Wis.
Simplex Oil Heating Corp., 11 Park Pl., New York 7, N. Y.
Sims Co., 18th & Whitley Sts., Erie, Pa.
Sinker-Davis Co., 230 S. Missouri St., Indianapolis 4, Ind.
Sioux Steel Co., P. O. Box 898, Sioux Falls, S. D.
Sipe & Co., James B., Box 8010, Pittsburgh 16, Pa.
Skaneateles Mfg. Co., Inc., 122 Dickerson St., Syracuse 2, N. Y.
●Skidmore Corp., St. Joseph, Mich.

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Skilbeck Mfg. Co., 7432 27th Ave., Kenosha, Wis.
Skilsaw, Inc., 5033 Elston Ave., Chicago 30, Ill.
Skinner Co., M. B., South Bend 21, Ind.
Skinner Electric Valve Div., 40 Belden Ave., Norwalk, Conn.
Skinner Engine Co., 337 W. 12th St., Erie, Pa.
Skinner Irrigation Co., 121 E. Canal St., Troy, O.
Skuttle Mfg. Co., 4099 Beaufait, Detroit 7, Mich.
Slant-Fin Radiator Corp., 5113-17 2nd Ave., Brooklyn, N. Y.
Sly Mfg. Co., W. W., 4700 Train Ave., Cleveland 2, O.
Small Motors, Inc., 2076 Elston Ave., Chicago 14, Ill.
●Smith Co., Inc., H. B., The, 64 Main St., Westfield, Mass.
Smith Co., J. B., 3327 B St., Philadelphia 34, Pa.
Smith Corp., A. O., 3533 N. 27th St., Milwaukee 1, Wis.
Smith Corp., Winfield, H., 144 Eaton St., Springfield, Erie County, N. Y.
Smith Filter Corp., 1603-2 Ave., Moline, Ill.
Smith & Kanzler Corp., E. Linden Ave., Linden, N. J.
Smith-Raymond Co., 1231-33 Tenth Ave., Columbus, Ga.
Smith & Serrell, Inc., 31 Clinton St., Newark 2, N. J.
Smith Twin Tubular Boiler Co., Inc., Cottman St., at State Rd., Philadelphia 35, Pa.
Smith Welding Equipment Corp., 2633 S. E. Fourth St., Minneapolis 14, Minn.
Smolensky Valve Co., Inc., 940 Broadway, Bedford, O.
Smooth-On Mfg. Co., 568-574 Communipaw Ave., Jersey City 4, N. J.
Snap-on Tools Corp., Kenosha, Wis.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York 4, N. Y.
Soldering Specialties Co., Summit, N. J.
Solvay Sales Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Somers, Inc., H. J., 6063 Wabash Ave., Detroit 8, Mich.
Somerville Iron Wks., Somerville, N. J.
Sonneborn Sons, Inc., L., 88 Lexington Ave., New York 16, N. Y.
Sonner Burner Co., 412-420 E. 6th Ave., Winfield, Kans.
Soreng Mfg. Co., 9551 Eden Ave., Schiller Park, Ill.
●South Bend Air Products, Inc., 322 E. Colfax Ave., South Bend 22, Ind.
South Chester Corp., Lester, Pa.
South Chester Tube Co., Front & Thurlow Sts., P. O. Box 60, Chester, Pa.
Southbridge Roofing Co., Inc., Hartwell and Chapin St., Southbridge, Mass.
Souther Iron Co., E. E., 1952 Kienlen Ave., St. Louis 20, Mo.
Southern States Iron Roofing Co., Stiles Ave. & Louisville Rd., Savannah, Ga.
Southport Paint Co., Div. Wesson Oil & Snowdrift Co., Inc., Savannah, Ga.
●Spang-Chalfant, Div. of National Supply Co., Grant Bldg., Pittsburgh 30, Pa.
Spartan Tool Co., 1918 Columbia Ave., Chicago 26, Ill.
Special Chemicals Corp., 30 Irving Pl., New York 3, N. Y.
Speed Selector Inc., 118 Noble Court, Cleveland 13, O.
Speedway Mfg. Co., 1834 S. 52nd Ave., Chicago (Cicero), Ill.
●Spence Engineering Co., Inc., 32 Grant St., Walden 6, N. Y.
●Spencer Heater Div., Avco Mfg. Corp., 164 Park St., Williamsport 19, Pa.
Spencer Thermostat Div., Metals & Controls Corp., 34 Forest St., Attleboro, Mass.
Spencer Turbine Co., 486 New Park Ave., Hartford 6, Conn.
Sponge Rubber Products Co., Shelton, Conn.
●Sporlan Valve Co., 7525 Sussex Ave., St. Louis 17, Mo.
Spray Engineering Co., 114 Central St., Somerville 45, Mass.
●Spraying Systems Co., 3219 Randolph St., Bellwood, Ill.
Sprayo-Flake Co., 2715 Irving Park Blvd., Chicago 18, Ill.
Springfield Boiler Co., 1939 E. Capitol Ave., Springfield, Ill.
Sprout-Waldron & Co., Muncy, Pa.
Square D Co., 6060 Rivard St., Detroit 11, Mich.
Square D Co., Industrial Controller Div., 4041 N. Richards St., Milwaukee 12, Wis.
Squires Co., C. E., The, 18502 Syracuse Ave., Cleveland 10, O.
Standard Asbestos Mfg. Co., 860 W. Evergreen Ave., Chicago 22, Ill.
Standard Electric Mfg. Co., West Berlin, N. J.
Standard Engineering Wks., 289 Roosevelt Ave., Pawtucket, R. I.
Standard Fuel Engineering Co., 667 Post Ave., S., Detroit 17, Mich.
Standard Furnace Supply Co., 413-17 S. Tenth St., Omaha 8, Neb.
Standard Heater & Oil Equipment Co., 245 Cornelison Ave., Jersey City 2, N. J.
Standard Machine & Mfg. Co., 8213-15 Gravois Ave., St. Louis 23, Mo.
Standard Oil Co. of California, Bldg. 605, West Olympic Blvd., Los Angeles, Calif.
Standard Oil Co. of Indiana, 910 S. Michigan Ave., Chicago, Ill.
Standard Pressed Steel Co., Box 810, Jenkintown, Pa.
Standard Reseater Corp., 423 W. 126th St., New York 27, N. Y.
Standard Rolling Mills, Inc., 196 Diamond St., Brooklyn 22, N. Y.
●Standard Stamping & Perforating Co., 3151 W. 49th Pl., Chicago 32, Ill.
Standard Stoker Co., Inc., Erie, Pa.
Standard Thermometer, Inc., 952 Dorchester Ave., Boston 25, Mass.
Standard Transmission Equipment Co., 78 W. Union St., Pasadena 1, Calif.
Standard Tube Co., 24400 Plymouth Rd., Detroit 28, Mich.
Standard Ventilator Co., Lewisburg, Pa.
Stanley Electric Tools, Div. of The Stanley Works, Myrtle St., New Britain, Conn.
Stanley Works, The, 195 Lake St., New Britain, Conn.
Staples & Pfeiffer, 528 Bryant St., San Francisco 7, Calif.
Sta-Rite Products, Inc., Delavan, Wis.
Star Expansion Bolt Co., 147 Cedar St., New York 6, N. Y.
Star-Kimball Electric Co., 200 Bloomfield Ave., Bloomfield, N. J.
Star Products Co., 130 Walnut Ave., New York 54, N. Y.
Star Tubular Products Co., 4747 S. Richmond St., Chicago, Ill.
Starr Piano Co., Richmond, Ind.
Steam Turbine Div., Worthington Pump & Machinery Corp., Wellsville, N. Y.
Stedco Products, 71 Leigh St., Wilkes-Barre, Pa.
Steel City Electric Co., 1201 Columbus Ave., Pittsburgh, Pa.
Steel Improvement & Forge Co., 974 E. 64th St., Cleveland 14, O.
Steel Products Engineering Co., The, 1205 W. Columbia St., Springfield, O.
●Stephens-Adamson Mfg. Co., 47 Ridgeway Ave., Aurora, Ill.
Sterling Air Conditioning Corp., 1430 K St., N. W., Washington, D. C.
Sterling Electric Motors, Inc., 5401 Anaheim Telegraph Rd., Los Angeles 22, Calif.
Sterling Engineering & Mfg. Corp., 114 Business St., Hyde Park 36, Mass.
●Sterling, Inc., 3744 N. Holton St., Milwaukee 12, Wis.
Sterling Radiator Co., Inc., Westfield, Mass.
Stevens Mfg. Co., Inc., Mansfield, O.
Stewart Ice Machine Co., 1282 W. 1st St., Pomona, Calif.
Stewart Mfg. Co., Inc., Grove Ave., Cedar Grove, N. J.
Stewart-Warner Corp., Heating Div., 1514 Drover St., Indianapolis, Ind.
Stic-Klip Mfg. Co., 50 Regent St., Cambridge 40, Mass.
Stickle Steam Specialties Co., 2215 Valley Ave., Indianapolis 1, Ind.
Stillwater Clay Products Co., The, 3334 Prospect Ave., Cleveland 15.
Stockham Valves & Fittings Co., Box 2592, Birmingham 2, Ala.
Stokes Machine Co., F. J., 5910 Tabor Rd., Philadelphia 20, Pa.
Stokes Molded Products, Inc., Taylor & Webster, Trenton 4, N. J.
Stokol Stoker Co., Inc., Dayton 1, O.
Stout & Sons, David, 7016 Manchester Blvd., St. Louis 17, Mo.
Stow Mfg. Co., 445 State St., Binghamton, N. Y.
Straight Line Foundry & Machine Corp., Direct Separator Div., The, 218 S. Geddes St., Syracuse 4, N. Y.
Strandwitz & Co., Inc., W. J., Jefferson and Master Sts., Camden, N. J.
Stratford Pipe Scalloper Machine Co., 49 Oakland Pl., Stratford, Conn.
Streine Tool & Mfg. Co., New Bremen, O.
Strong, Carlisle & Hammond Company, 1392 W. Third St., Cleveland 13, O.
Struthers-Dunn, Inc., 150 N. 13th St., Philadelphia 7, Pa.
●Struthers Wells Corp., Titusville, Pa.
Stuart Co., W. W., 417 Ninth St., Des Moines 9, Iowa.
Sturtevant Co., P. A., Addison, Ill.
Sudbury Laboratory, South Sudbury, Mass.
Sulflo, Inc., 1143 E. Jersey St., Elizabeth 4, N. J.
Sumo Pumps, Inc., 1 Atlantic St., Stamford, Conn. Sun Oil Co., 1608 Walnut St., Philadelphia 3, Pa.
Sundstrand Machine Tool Co., Hydraulic Div., 2531 11th St., Rockford, Ill.
Sun-Fire Stoker Corp., New Albany, Ind.
Sun-Ray Burner Mfg. Corp., 139-24 Queens Blvd., Jamaica 2, N. Y.
Super Electric Products Corp., 1057 Summit Ave., Jersey City, N. J.
Super Mold Corp., 402 N. Sacramento St., Lodi, Calif.
Super Radiator Corp., 6714 Walker St., St. Louis Park, Minneapolis 16, Minn.
Superior Combustion Industries, Inc., 1475 Broadway, New York 18, N. Y.
Superior Steel Corp., Grant Bldg., Pittsburgh 19, Pa.
Superior Tube Co., Norristown, Pa.
Superior Valve and Fittings Co., 1509 W. Liberty Ave., Pittsburgh 26, Pa.
Supersonics Corp. of America, 231 E. 47th St., New York, N. Y.
Supreme Air Filter Co., 126 W. 21st St., New York, N. Y.
Supreme Electric Products Corp., 194 Vassar St., Rochester 7, N. Y.
Surface Combustion Corp., 2375 Dorr St., Toledo 1, O.
Sutton Corp., O. A., 1812 W. Second St., Wichita 2, Kan.
Swaby Mfg. Co., 3818 W. Armitage Ave., Chicago 47, Ill.
Swaine Mfg. Co., Fred J., 1300 N. Seventh St., St. Louis 6, Mo.
Swallow Airplane Co., Wichita, Kan.
●Swartwout Co., 18511 Euclid Ave., Cleveland 12, O.
Swift Lubricator Co., 19 James Bldg., Elmira, N. Y.
Swift Mfg. Co., Inc., 1455 E. Nine Mile Rd., Hazel Park, Mich.
Syncromatic Corp., Watertown, Wis.
Synchro-Start Products, Inc., 1046 W. Fullerton Ave., Chicago 14, Ill.
Syntron Co., Homer City, Pa.

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T & H Engineering Co., 401 Main St., Little Ferry, N. J.
Taber Pump Co., 272 Elm St., Buffalo 3, N. Y.
●Taco Heaters, Inc., 137 South St., Providence, R. I.
Tagliabue Instruments Div., Weston Electric Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.
Tal Bender, Inc., 417 N. Water St., Milwaukee 2, Wis.
Taller & Cooper, Inc., 75 Front St., Brooklyn 1, N. Y.
Tallmadge Systems, Webster, Div. of Hoffman Specialty Co., 1001 York St., Indianapolis 7, Ind.
Tamms Industries, Inc., 228 N. LaSalle St., Chicago 1, Ill.
●Taylor Forge & Pipe Wks., P. O. Box 485, Chicago 90, Ill.
●Taylor Instrument Companies, 95 Ames St., Rochester 1, N. Y.
Taylor Sons Co., Charles, 710 Burns St., Cincinnati 14, O.
Taylor-Winfield Corp., 1052 Mahoning Ave., N. W., Warren, O.
Technical Ply-Woods, 228 N. LaSalle St., Chicago 1, Ill.
Techniflex Corp., Port Jerris, N. Y.
Techtmann Industries, Inc., 714 W. Wisconsin Ave., Milwaukee 1.
Tecumseh Products Co., Tecumseh, Mich.

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Telechron, Inc., Ashland, Mass.
Telsit Insulation Co., 1933 West Farms Rd., Bronx 60, N. Y.
Temp-Control, Inc., 208 State St., Peoria, Ill.
Templeton Bros., 177 Reservation Rd., Hyde Park 36, Mass.
Tempo Products Co., 1900 Euclid Ave., Cleveland 15, O.
Temprite Products Corp., Dept. HPAC, E. Maple Rd., Birmingham, Mich.
●Tennessee Coal, Iron & Railroad Co., United States Steel Corp. Subsidiary, Brown-Marx Bldg., Birmingham 2, Ala.
Tennessee Products and Chemical Corp., American National Bank Bldg., Nashville, Tenn.
Tenney Engineering, Inc., 26 Avenue B, Newark 5, N. J.
Ter-I-Day Sales & Engineering Co., 18426 Grand River, Detroit, Mich.
Terra-Temp Co., Inc., Circle Bldg., Indianapolis 4, Ind.
●Terre Haute Boiler Works Co., 1140 Crawford, Terre Haute, Ind.
Terry Steam Turbine Co., The, P. O. Box 1200, Hartford 1, Conn.
Texas Co., The, 135 E. 42nd St., New York 17, N. Y.
Textite Corp., 2110 Roscoe St., Chicago 18, Ill.
Thermac Co., 800 E. 108th St., Los Angeles, Calif.
Thermal Co., Inc., 1434 N. Fourth St., Milwaukee, Wis.
Thermal Industries, Box No. 725, Indio, Calif.
Thermek Sales Co., P. O. Box 268, Whiteater, Wis.
Thermix Corp., The, First National Bank Bldg., Greenwich, Conn.
Therm-O-Disc, Inc., 127 Crouse St., Mansfield, O.
Thermoid Co., Trenton, N. J.
Thomas Co., Arthur H., W. Washington Square, Philadelphia, Pa.
Thompson & Co., 1085 Allegheny Ave., Oakmont, Pa.
Thompson & Son Co., The Henry G., 277 Chapel St., New Haven, Conn.
Thompson Research & Mfg. Co., Davenport, Fla.
Thomson Electric Welder Co., 161 Pleasant St., Lynn, Mass.
Thomson Industries, Inc., Manhasset, N. Y.
Thor Tool & Die Co., 3444 Morrison Ave., Oakland, Calif.
Thread-Ezy Mfg. Co., Corunna, Mich.
Threadwell Tap & Die Co., Greenfield, Mass.
Three Point Industries, 3767 N. Racine Ave., Chicago 13, Ill.
●Thrush & Co., H. A., Peru, Ind.
Thwing-Albert Instrument Co., Penn and Pulaski Ave., Philadelphia 44, Pa.
Tierney Rotor Ventilator Co., 239 Fourth Ave., S., Minneapolis, Minn.
Tiffin Eaves Trough Clamp Co., 25 Miami, Tiffin, O.
Tilco-Fin-Tubing Div., David E. Kennedy, Inc., 58 Second Ave., Brooklyn 15, N. Y.
Timken Roller Bearing Co., 1835 Dueber Ave., S. W., Canton 6, O.
Timken Silent Automatic Div., Timken-Detroit Axle Co., Jackson, Mich.
Tinnerman Products, Inc., P. O. Box 6688, Cleveland 1, O.
Tippett & Wood, Morris and Warren Sts., Phillipsburg, N. J.
Titchener, E. H. & Co., 67 Clinton St., Binghamton, N. Y.
Titeflex, Inc., 469 Frelinghuysen Ave., Newark 5, N. J.
●Titus Mfg. Corp., 113 E. 8th St., Waterloo, Iowa
Titusville Iron Wks. Co., The, Titusville, Pa.
Todd Shipyards Corp., Combustion Equipment Div., 81-16-45th Ave., Elmhurst, L. I., N. Y.
Toledo Pipe Threading Machine Co., 1445 Summit St., Toledo 4, O.
Torit Mfg. Co., 292 Walnut St., St. Paul 2, Minn.
Tork Clock Co., Inc., 1 Grove St., Mt. Vernon, N. Y.
Torq Electric Mfg. Corp., 1006 Interstate St., Bedford, O.
Torrington Co., The, Bantam Bearings Div., South Bend 21, Ind.
Torrington Mfg Co., 70 Franklin St., Torrington, Conn.
Torrington Mfg. Co., The, Western Div., 1000 N. Orange Dr., Los Angeles 38, Calif.
Trade-Wind Motorfans, Inc., 5707 S. Main St., Los Angeles 37, Calif.
Trageser Copper Wks., Inc., 5000 Grand Ave., Maspeth, Long Island, N. Y.
●Trane Co., The, La Crosse, Wis.
Trent, Inc., Leverington Ave. and Wilde St., Philadelphia 27, Pa.
Trent Tube Co., 430 Church St., East Troy, Wis.
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit 16, Mich.
Triangle Mfg. Co., 396 Division St., Oshkosh, Wis.
Tri-Clover Machine Co., 2809 60th St., Kenosha, Wis.
Trimont Mfg. Co., Div. of Aetna Industrial Corp., 55-71 Amory St., Roxbury, Boston 19, Mass.
Trimount Instrument Co., 3415 W. Cermak Rd., Chicago 23, Ill.
Trimount Rotary Power Co., 189 Cedar St., Dedham, Mass.
Trindl Products, Ltd., 17 E. 23rd St., Chicago 16, Ill.
Trion, Inc., McKees Rocks, Pa.
Triplex Heating Specialty Co., Inc., 252 N. Grant, Peru, Ind.
Trombetta Solenoid Corp., 329 N. Milwaukee St., Milwaukee 2, Wis.
Tropical Paint & Oil Co., 1244-82 W. 70th St., Cleveland 2, O.
Troy Engine & Machine Co., 20 Railroad Ave., Troy, Pa.
Truetite Corp., The, 36 Union Ave., Bridgeport 7, Conn.
Truflo Fan Co., 523 Main St., Harmony, Pa.
Tru-Line Corp., 1725 Clover Field Blvd., Santa Monica, Calif.
Trumbull Electric Mfg. Co., The, Woodford Ave., Plainville, Conn.
Truscon Laboratories, Caniff and Trunk R. R., Detroit 11, Mich.
Truscon Steel Co., 1315 Albert St., Youngstown 1, O.
Tryco Products, Inc., Railroad Sq., Westfield, Mass.
Tube Turns, Inc., 224 E. Broadway, Louisville 1, Ky.
Tubing Seal-Cap, Inc., 2810 E. 11th St., Los Angeles 23, Calif.
Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif.
Turner Brass Wks., The, 821-47 Park Ave., Sycamore, Ill.
Tuthill Pump Co., 939 E. 95th St., Chicago 19, Ill.
●Tuttle & Bailey, Inc., Corbin Ave., New Britain, Conn.
Tweco Products Co., P. O. Box 666, Wichita 1, Kan.
Twin Disc Clutch Co., 1310 Preston St., Rockford 16, Ill.
Typhoon Air Conditioning Co., Inc., 794 Union St., Brooklyn 15, N. Y.

U

U. S. Electrical Motors, Inc., 200 E. Slauson Ave., Los Angeles 54.
U. S. Electrical Tool Co., 1050 Findlay St., Cincinnati 14, O.
U. S. Expansion Bolt Co., P. O. Box 827, State St. & P.R.R., York, Pa.
U. S. Gutta Percha Paint Co., 43 Dudley St., Providence 1, R.I.
U. S. Machine Corp., Lebanon, Ind.
U. S. Pipe & Mfg. Co., 249 First St., San Francisco 5, Calif.
U. S. Plug & Fitting Co., 501 High Ave., Cleveland 15, O.
USHCO Mfg. Co., Inc., 135 Tonawanda St., Buffalo 7, N. Y.
Uehling Instrument Co., 473 Getty Ave., Paterson 3, N. J.
Ultrasonic Corp., 61 Rogers St., Cambridge 42, Mass.
Unexcelled Chemical Corp., 350 5th Ave., New York, N. Y.
Unified Air Conditioner Co., Torry Bldg., Duluth, Minn.
Uniflow Mfg. Co., E. Lake Rd., Erie, Pa.
Unimax Switch Div., W. L. Maxson Corp., 461 W. 34th St., New York 1, N. Y.
●Union Asbestos & Rubber Co., 1821 S. 54th Ave., Cicero 50, Ill.
Union Iron Wks., 1500 Cascade St., Erie, Pa.
Union Malleable Mfg. Co., Ashland, O.
Union Metal Wks., 128 Carter St., Chelsea 50, Mass.
Union Steam Pump Co., Capitol Ave., S. W., Battle Creek, Mich.
Union Water Meter Co., 333 Hermon St., Worcester, Mass.
Unistrut Products Co., 1013 W. Washington Blvd., Chicago 7, Ill.
Unit Alarm Co., The, P. O. Box 727, Elizabethton, Tenn.
United Chromium, Inc., 100 E. 42nd St., New York 17, N. Y.
United Conditioning Corp., 74 Varick St., New York 13, N. Y.
●United Cooling Tower Co., 406 W. 34th St., Kansas City, Mo.
United Cork Companies, Central Ave., Kearny, N. J.
●United Electric Controls Co., 85 School St., Watertown, Mass.
United Electric Service Co., P. O. Box 119, Wichita Falls, Tex.
United Industries, Box 449, Madison 1, Wis.
United Metal Hose Co., Inc., 36-01 43rd Ave., Long Island City 1, N. Y.
●United States Air Conditioning Corp., 33rd & Como Ave., S. E., Minneapolis 14, Minn.
United States Gasket Co., 602 N. 10th St., Camden, N. J.
United States Gauge Div. of American Machine and Metals, Inc., Sellersville, Pa.
United States Gypsum Co., 300 W. Adams St., Chicago 6, Ill.
United States Mineral Wool Co., South Milwaukee, Wis.
United States Ozone Co. of America, Crescent St., Scottdale, Pa.
United States Pipe & Foundry Co., Burlington, N. J.
United States Radiator Corp., 300 Buhl Bldg., Detroit 31, Mich.
United States Register Co., Burnham St., Battle Creek, Mich.
United States Rubber Co., 1230 Sixth Ave., New York 20, N. Y.
●United States Steel Co., Carnegie Bldg., Pittsburgh 30, Pa.
United States Stoneware Co., 60 E. 42nd St., New York 17, N. Y.
Universal Air Filter Corp., 332 W. Michigan St., Duluth 2, Minn.
Universal Convector Corp., 230 Manida St., New York 59, N. Y.
Universal Cooler, Div. of Newport Steel Corp., 299 Joseph St., Marion, O.
Universal-Cyclops Steel Corp., Bridgeville, Pa.
Universal Gypsum & Lime Co., 111 W. Washington St., Chicago, Ill.
Universal Welder Corp., 735 Carnegie Ave., Cleveland 15, O.
Uno Ventilator Co., 565 Lincoln Ave., Cliftondale, Mass.
Up-Right Scaffolds, 1013 Pardee St., Berkeley, Calif.
Utica Products, Inc., Utica 4, N. Y.
Utica Radiator Corp., 2201 Dwyer Ave., Utica 2, N. Y.
Utility Appliance Corp., 4851 S. Alameda St., Los Angeles 11, Calif.
Utility Laboratory, Inc., 330 36th St., Brooklyn 32, N. Y.

V

V. & E. Products, Inc., Schuylkill Haven, Pa.
V-Belt Clutch Co., 418 N. Western Ave., Los Angeles 4, Calif.
Vacuum-Electronic Engineering Co., 756 Third Ave., Brooklyn 32, N. Y.
Valley Foundry & Machine Works, Inc., Fresno, Calif.
Vanderman Mfg. Co., Mansfield Ave., Willimantic, Conn.
Van Dorn Electric Tool Co., Towson 4, Md.
Van Noorden Co., E., 100 Magazine St., Boston 19, Mass.
Van-Packer Corp., 124 W. Adams St., Chicago 3, Ill.
Vanton Pump Corp., Empire State Bldg., New York 1, N. Y.
Vapofier Corp., 10316 S. Throop St., Chicago 43, Ill.
Vapor Heating Corp., 80 E. Jackson Blvd., Chicago 4, Ill.
Vapor Specialty Co., 101 W. 42nd St., New York 18, N. Y.
Ventilating Products Co., 2800 Cottage Grove Ave., Chicago, Ill.
Verson Allsteel Press Co., 93rd & Kenwood Ave., Chicago 19, Ill.
Verson Mfg. Co., Holmes St. at Ledbetter Dr., Dallas 8, Tex.
Vesco Corp., 1381 Sedgwick Ave., New York 52, N. Y.
Vibration Eliminator Co., 10-28 47th Ave., Long Island City 1, N. Y.
Victaulic Co. of America, 30 Rockefeller Plaza, New York 20, N. Y.
Victor Electric Products, Inc., 2950 Robertson Rd., Cincinnati 9, O.
Viking Air Conditioning Corp., 5600 Walworth Ave., Cleveland 2, O.
Viking Copper Tube Co., 16700 St. Clair Ave., Cleveland 10, O.
Viking Mfg. Corp., 1747 Chester Ave., Cleveland 14, O.
Viking Pump Co., Fourth and Rouse Sts., Cedar Falls 1, Ia.
Viking Shear Co., 1063 W. 19th St., Erie, Pa.
Vilter Mfg. Co., The, 2148 S. First St., Milwaukee 7, Wis.
Vinco Co., Inc., The, 305 E. 45th St., New York 17, N. Y.
Virginia Smelting Co., West Norfolk, Va.
Vogt Machine Co., Henry, 1000 W. Ormsby St., Louisville 10, Ky.

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Voss Co., Inc., J. H. H., 785 E. 144th St., Corner of Wales Ave., New York 54, N. Y.
Vulcan Electric Co., 88-90 Holten St., Danvers, Mass.
●Vulcan Radiator Co., 26 Francis Ave., Hartford 6, Conn.

W

W. G. B. Oil Clarifier, Inc., Kingston, N. Y.
Wabash Mfg. Co., 2318 S. Western Ave., Chicago 8, Ill.
Wachs Co., E. H., The, 1525 N. Dayton St., Chicago 22, Ill.
Wade Mfg. Co., Elgin, Ill.
Wagner Awning & Mfg. Co., 2658 Scranton Rd., Cleveland, O.
●Wagner Electric Corp., 6370 Plymouth Ave., St. Louis 14, Mo.
●Waldron Corp., John, New Brunswick, N. J.
Walker Jamar Co., 365 S. First Ave., E., Duluth, Minn.
Wall Chemicals Div. of The Liquid Carbonic Corp., 3100 S. Kedzie Ave., Chicago 23, Ill.
●Wallace Co., William, Metalbestos Div., Belmont, Calif.
Wallace Supplies Mfg. Co., 1304-12 Diversey Pkwy., Chicago 14, Ill.
Wallace & Tiernan Co., Inc., P. O. Box 178, Newark 1, N. J.
Walsh Co., The, L. M., 420 Boylston St., Boston 16, Mass.
Walsh-Holyoke Steam Boiler Co., Holyoke, Mass.
Walsh Refractories Corp., 101 Ferry St., St. Louis 7, Mo.
Walton Co., Box 5, Elmwood Branch, Hartford 10, Conn.
Walton Laboratories, Inc., 1186 Grove St., Irvington 11, N. J.
●Walworth Co., 60 E. 42nd St., New York 17, N. Y.
Ward Foundries, Inc., J. P., Blossburgh, Pa.
●Ward Leonard Electric Co., 24 South St., Mt. Vernon, N. Y.
Ware Coupling & Nipple Co., Ware, Mass.
Warlo Corp., 330 W. 42nd St., New York 18, N. Y.
Warner Lewis Co., 817 N. Lewis Pl., Tulsa, Okla.
Warner Ventilator Co., 225 Spring St., La Grange, Ind.
Warren Foundry & Pipe Corp., 55 Liberty St., New York 5, N. Y.
Warren Refining & Chemical Co., The, 750 Prospect Ave., Cleveland 15, O.
Warren Steam Pump Co., Inc., 300 Bridges Ave., Warren, Mass.
Washburne & Co., E. G., 207 Fulton St., New York, N. Y.
Washington Steel Corp., Griffith Ave., Washington, Pa.
Water Cooling Corp., 71 Nassau St., New York 7, N. Y.
Water Cooling Equipment Corp., New Hampshire Ave. & Weber Rd., Affton Station, St. Louis 23, Mo.
Water Cooling Tower Co., 5501 Cornell Ave., Chicago, Ill.
Water Refining Co., 1123 Barthold, Ft. Wayne, Ind.
Water Service Laboratories, Inc., 423 W. 126th St., New York 27, N. Y.
Water Tight Underground Conduit, 101½ Stratford, Houston 6, Tex.
Water Treatment Company of America, 1159 Hodgkiss St., Pittsburgh 12, Pa.
Waterfilm Boilers, Inc., 154 Ogden Ave., Jersey City 7, N. J.
Watson & McDaniel Co., 440 N. Marshall, Philadelphia 23, Pa.
Watson-Standard Co., 225 Galveston Ave., Pittsburgh 30, Pa.
Watson-Stillman Co., 140 Aldene Rd., Roselle, N. J.
Watts Regulator Co., 10 Embankment St., Lawrence, Mass.
Waukesha Motor Co., Waukesha, Wis.
Waverly Heating Supply Co., 31 Union St., Boston 8, Mass.
Wayne Pump Co., Ft. Wayne 4, Ind.
Weatherhead Co., The, 300 E. 131st St., Cleveland 8, O.
Webb Corp., The, Webb City, Mo.
Webb Machine & Tool Co., Imperial, Pa.
Webber Engrg. Corp., 411 Board of Trade Bldg., Indianapolis, Ind.
●Webster & Co., Warren, 1664 Federal St., Camden, N. J.
Webster Electric Co., S. W. Corner Clark & DeKoven Aves., Racine, Wis.
●Webster Engineering Co., P. O. Box 2168, Tulsa 1, Okla.
Wedgeplug Valve Co., Inc., 1300 S. Broad Ave., New Orleans, La.
Wedge Protectors, Inc., 3985 Jennings Rd., Cleveland 9, O.
Weil-McLain Co., Michigan City, Ind.
●Weil Pump Co., 1523 N. Fremont St., Chicago 22, Ill.
●Weinman Pump Mfg. Co., The, 290 W. Spruce St., Columbus 8, O.
Weirton Steel Co., Weirton, W. Va.
Weiss & Co., H., 113-115 Mercer St., New York, N. Y.
Weksler Thermometer Corp., 52-56 W. Houston St., New York 12, N. Y.
Weldex, Inc., 7326 McDonald Ave., Detroit, Mich.
Welding Apparatus Co., 2750 W. Van Buren St., Chicago, Ill.
●Welding Fittings Corp., New Castle, Pa.
Welsbach Corp., The, Kitson Div., 1500 Walnut St., Philadelphia, Pa.
Welsbach Corp., The, Ozone Processes Div., 1500 Walnut St., Philadelphia 2, Pa.
Western Blower Co., 1800 Airport Way, Seattle 4, Wash.
Western Brass Mills Div. of Olin Industries, Inc., East Alton, Ill.
Western Chemical Co., 713 Washington St., Kansas City 6, Mo.
●Western Engineering & Mfg. Co., 1726 E. Washington Blvd., Los Angeles 21, Calif.
Western Felt Works, 4029-4117 Ogden Ave., Chicago 23, Ill.
Western Hanger Co., 55 New Montgomery St., San Francisco, Calif.
Western Lithograph Co., 600 E. 2nd St., Los Angeles 54, Calif.
Western Mineral Products Co., 1720 Madison St., N. E., Minneapolis 13, Minn.
Western Piping & Engineering Co., 119 Kansas St., San Francisco 3, Calif.
Western Precipitation Corp., 1016 W. 9th St., Los Angeles, Calif.
Western Thermal Equipment Co., 1701 W. Slauson Ave., Los Angeles 44, Calif.
Western Wire & Iron Works, Inc., 957 W. 18th Pl., Chicago 8, Ill.
Western Wire Products Co., 1415-35 S. 18th St., St. Louis 4, Mo.
Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.
●Westinghouse Electric Corp., Sturtevant Div., Hyde Park, Boston, Mass.
Weston Electrical Instrument Corp., 619 Frelinghuysen Ave., Newark 5, N. J.
●Wheatland Tube Co., 1300 Bankers Securities Bldg., Philadelphia 7, Pa.
Wheelco Instruments Co., Harrison and Peoria Sts., Chicago 7, Ill.
●Wheeler Mfg. Co., C. H., 1739 Sedgley Ave., Philadelphia 32, Pa.
Wheeling Machine Products Co., Wheeling, W. Va.
Wheeling Steel Corp., Wheeling Steel Corp. Bldg., Wheeling, W. Va.
Whirlaway Motors, Inc., Tipp City, O.
White Flomatic Corp., P. O. Box 267, Hoosick Falls, N. Y.
White & Sons, Inc., Wilfrid O., 216 High St., Boston 10, Mass.
White Mfg. Co., 2362 University Ave., St. Paul 4, Minn.
●White-Rodgers Electric Co., 1209 Cass Ave., St. Louis 6, Mo.
Whiteley Bearing Corp., 1283 S. Ashland Ave., Chicago, Ill.
Whiting Corp., Harvey, Ill.
Whiting Fire Power Products Corp., 1501 N. First St., Superior, Wis.
Whitlock Mfg. Co., 44 South St., Hartford 10, Conn.
Whitney Chain Co., 237 Hamilton St., Hartford 2, Conn.
Whitney Mfg. Co., W. A., 636 Race St., Rockford, Ill.
Whitney Metal Tool Co.. 110 Forbes St., Rockford, Ill.
Whittaker Co., Wm. R., 915 N. Citrus, Los Angeles, Calif.
Whittington Pump & Engineering Corp., 1126 Prospect, Indianapolis 3, Ind.
Whitty Co., Inc., 86 Western Ave., Boston 34, Mass.
Wickes Boiler Co., 502 N. Water St., Saginaw, Mich.
Wickwire Spencer Steel, Div. of Colorado Fuel & Iron Corp., 500 Fifth Ave., New York 18, N. Y.
Wiedemann Machine Co., 4272 Wissahickon Ave., Philadelphia 32, Pa.
●Wiegand Co., Edwin L., 7610 Thomas Blvd., Pittsburgh 8, Pa.
Wiggins Oil Tool Co., Inc., E. B., 3424 E. Olympic Blvd., Los Angeles 23, Calif.
Wilbur & Williams Co., Greenleaf & Leon Sts., Boston 15, Mass.
Wilcolator Co., 1001 Newark Ave., Elizabeth B, N. J.
Wilhelm Co., A., 3rd and Bern Sts., Reading, Pa.
Wilkinson Products Co., P. O. Box 1774, Wilshire-La Brea Sta., Los Angeles 36, Calif.
Will Corp., 35 Russell St., Rochester 3, N. Y.
Will-Burt Co., The, Orrville, O.
Williams & Co., J. H., Buffalo 7, N. Y.
Williams Co., Inc., B. S., 6 North St., Mt. Vernon, N. Y.
Williams Gauge Co., The, 1620 Pennsylvania Ave., N. S., Pittsburgh 12, Pa.
Williams Oil-O-Matic Div., Eureka Williams Corp., 1201 East Bell, Bloomington, Ill.
Williams & Son, I. B., Dover, N. H.
Williams Valve Co., D. T., Div. of The Schaible Co., 1086 Summer St., Cincinnati 4, O.
Williamson Heater Co., 4558 Marburg Ave., Cincinnati 9, O.
Willis Steel Corp., 156 N. Academy St., Galesburg, Ill.
Willson Products, Inc., 348 Thorn St., Reading, Pa.
Will-Weld Mfg. Co., Inc., 1533 Marcy St., Omaha 2, Nebr.
Wiley's Carbide Tool Co., 1340 W. Vernor Highway, Detroit, Mich.
Wilson & Co., Inc., 4100 S. Ashland Ave., Chicago 9, Ill.
Wilson Co., H. A., The, 105 Chestnut St., Newark, N. J.
Wilson Co., K. R., 215 Main St., Buffalo, N. Y.
Wilson Engineering Corp., 122 S. Michigan Ave., Chicago 3, Ill.
Wilson, Inc., Thomas C., 21-11 44th Ave., Long Island City, N. Y.
Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York 17, N. Y.
Wind-Way Fan & Ventilator Co., 527 St. Joseph St., New Orleans 2, La.
●Wing Mfg. Co., L. J., 140 Vreeland Mills Rd., Linden, N. J.
Winkler & Sons, Inc., A. E., 2337 N. 31st St., Milwaukee 10, Wis.
Winslow Engineering Co., 4069 Hollis, Oakland 8, Calif.
Wiss & Sons Co., J., 33 Littleton Ave., Newark 7, N. J.
Witte Engine Works, Div. of Oil Well Supply Co., United States Steel Corp., Sub., 1600 Oakland Ave., Kansas City 3, Mo.
Wittenmeier Machinery Co., 850-860 N. Spaulding Ave., Chicago 51, Ill.
Wodack Electric Tool Corp., 4627 W. Huron St., Chicago 44, Ill.
Wolfe-Kote Co., Inc., 820 Penn. Ave.. Sheboygan, Wis.
●Wolverine Tube Div., Calumet and Hecla Consolidated Copper Co., 1419 Central Ave., Detroit 9, Mich.
Wood Conversion Co., 1981 First National Bank Bldg., St. Paul 1, Minn.
Wood Co., John, Conshohocken, Pa.
Wood Steel Co., Alan, Conshohocken, Pa.
Wood's Sons Co., T. B., 1275 Fifth Ave., Chambersburg, Pa.
Worner Electronic Devices, Rankin, Ill.
Worthington-Gamon Meter Co., Newark, N. J.
Worthington Pump & Machinery Corp., Dunellen, N. J.
Worthington Pump & Machinery Corp., Harrison & Worthington Sts., Harrison, N. J.
●Worthington Pump & Machinery Corp., Air Conditioning & Refrigeration Div., Harrison, N. J.
Wright-Austin Co., 3245 Wight St., Detroit 7, Mich.
Wysong & Miles, 625 Fulton St., Greensboro, N. C.

X

X L Refrigerating Co., 1834 W. 59th St., Chicago 36, Ill.
X Laboratories, Inc., 25 W. 45th St., New York 19, N. Y.
X-Pando Corp., 43-15 36th St., Long Island City 1, N. Y.

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Yale & Towne Mfg. Co., Stamford, Conn.
Yardley Plastics Co., 138 Parsons Ave., Columbus 15, O.
●Yarnall-Waring Co., 107 Mermaid Ave., Philadelphia 18, Pa.
Yates-American Machine Co., Beloit, Wis.
Yeomans Bros. Co., 1471 N. Dayton St., Chicago 22, Ill.
York Corp., Roosevelt Ave., York, Pa.
York Corrugating Co., Adams St. & W. M. R. R., York, Pa.
York Electric & Machine Co., 30-34 N. Penn St., York, Pa.
●York-Shipley, Inc., York, Pa.
Yost Mfg. Co., Meadville, Pa.
Young & Bertke Co., 1004-1014 Hulbert Ave., Cincinnati 14, O.
●Young Radiator Co., 709 S. Marquette St., Racine, Wis.
Young Regulator Co., 5209 Euclid Ave., Cleveland 3, O.
●Youngstown Sheet & Tube Co., Stambaugh Bldg., Youngstown 1, O.
Yula Water Heaters, Inc., 166 W. 225th St., New York, N. Y.

Z

Zaco Laboratories, Div., Zip Abrasive Co., 1360 W. 9th St., Cleveland, O.
●Zallea Brothers, Taylor and Locust St., Wilmington 99, Del.
Zeh & Hahnemann Co., 182-200 Vanderpool St., Newark 5, N. J.
Zenith Electric Co., 152 W. Walton St., Chicago 10, Ill.
Zimmerman Packing Co., 2768 Highland Ave., Cincinnati 12, O.
●Zink Co., John, P. O. Box 310, Tulsa 1, Okla.
Zone-Heat Regulator Co., Box 188, Garrettsville, O.
Zonolite Co., 135 S. LaSalle St., Chicago 3, Ill.
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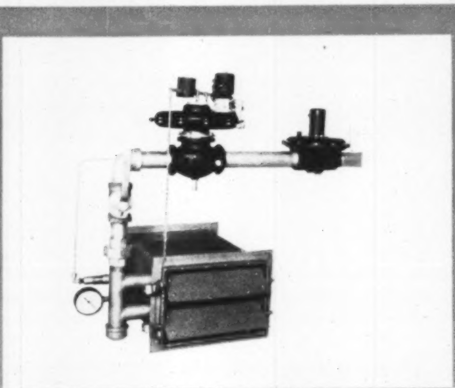

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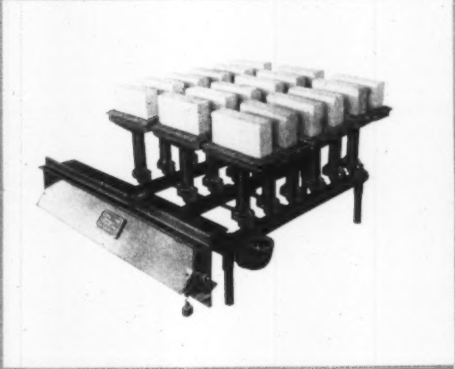

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VR Burners are especially designed for boilers having low draft and small combustion space.

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JOHN ZINK COMPANY

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T-460
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Room Thermostat

the Right way to control Unit Ventilators . . . the JOHNSON "Master-Submaster" method

HERE ARE THE ADVANTAGES—

- **Stable discharge temperature** . . . The controlling element is located directly above the heating coil. The results—
  CONSTANT SPACE TEMPERATURE — NO DRAFTS
- **Quick response to variations in steam pressure** and other influences which ordinarily produce unstable control.
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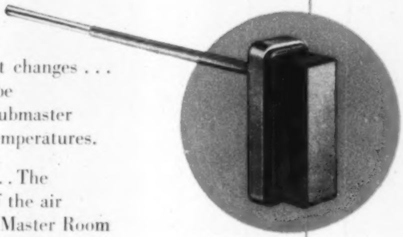
- **Both high and low limits** of the discharge temperature are provided . . . The Submaster Airstream Thermostat controls the temperature of the air discharged by the unit between those limits, as directed by the Master Room Thermostat. (When a Johnson "*DUAL*" Room Thermostat is used, as illustrated, it controls at reduced temperature during non-occupancy periods.)



T-325
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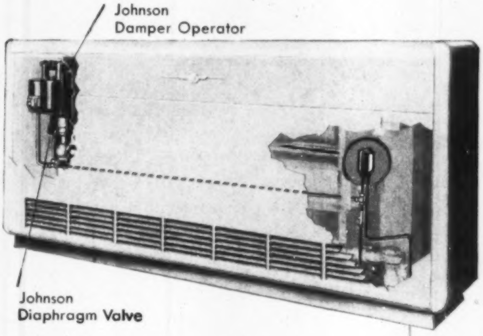
Airstream Thermostat



OPERATING CYCLE—

During the "warm-up" period, the unit delivers air which is heated to the maximum possible temperature. As the room approaches the desired temperature, the Johnson operator opens the outdoor air damper to a fixed minimum position and the Johnson valve on the heating coil throttles.

If the room tends to overheat, the valve closes and the outdoor air damper gradually moves to its maximum open position.

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